

z/OS



Security Server RACF Diagnosis Guide

z/OS



Security Server RACF Diagnosis Guide

Note!

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 245.

Fourth Edition, September 2002

This is a major revision of GA22-7689-02. This edition applies to Version 1 Release 4 of z/OS (5694-A01), Version 1 Release 4 of z/OS.e (5655-G52) and to all subsequent releases and modifications until otherwise indicated in new editions.

Order documents through your IBM® representative or the IBM branch office serving your locality. Documents are not stocked at the address below.

IBM welcomes your comments. A form for readers' comments may be provided at the back of this document, or you may address your comments to the following address:

International Business Machines Corporation
Department 55JA, Mail Station P384
2455 South Road
Poughkeepsie, NY 12601-5400
United States of America

FAX (United States & Canada): 1+845+432-9405

FAX (Other Countries):

Your International Access Code +1+845+432-9405

IBMLink™ (United States customers only): IBMUSM10(MHVRCFS)

Internet e-mail: mhvrfs@us.ibm.com

World Wide Web: <http://www.ibm.com/servers/eserver/zseries/zos/webqs.html>

If you would like a reply, be sure to include your name, address, telephone number, or FAX number.

Make sure to include the following in your comment or note:

- Title and order number of this document
- Page number or topic related to your comment

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

© Copyright International Business Machines Corporation 1994, 2002. All rights reserved.

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

Figures	vii
Tables	ix
About this document	xi
Who should use this document	xi
How to use this document	xi
Where to find RACF information	xiii
Where to find more information	xiv
IBM systems center publications	xvi
Other sources of information	xvi
To request copies of IBM publications	xviii
Summary of changes	xix
Chapter 1. Starting diagnosis	1
Planning for problem diagnosis	1
Troubleshooting the problem	1
Diagnosis hints	2
Troubleshooting tables for problems in RACF	7
Using the troubleshooting tables	7
Troubleshooting tables:	9
Performing a preliminary search for a matching problem.	34
Introduction to procedure	34
Related information	35
Procedure.	35
Examples of search arguments for RACF	38
Chapter 2. Collecting and analyzing problem data	41
Collecting problem data.	41
Obtaining a description of a RACF installation	41
Obtaining a system dump	41
Formatting a system dump	42
Obtaining RACF return codes and reason codes from a RACF macro invocation	42
Obtaining RACF return codes and reason codes from a RACF callable service invocation	43
Obtaining traces	43
Obtaining traces for program control and Program Access to Data Set (PADS) errors	44
Obtaining traces on z/OS UNIX System Services	48
Obtaining trace records using the SET TRACE command	48
Validating input	75
Identifying the caller of RACF	75
Checking the parameter list passed to RACF.	77
Searching for a matching problem	78
Prerequisites.	78
Introduction to procedure	78
Procedure.	78
Application Identity Mapping Considerations	79
LOGREC data set entries for the alias index	80
Recovering from errors with Application Identity Mapping	80
Using SAF Trace to debug IBM HTTP server problems	81

Before you begin	81
Starting the trace	81
The order of trace calls	82
Examples of each of the post records	82
Using the trace to find problems	92
Chapter 3. Reporting RACF problems to IBM.	97
Prerequisites.	97
Introduction to procedure	97
Procedure.	97
Chapter 4. Troubleshooting your RACF database	105
Format of the RACF database	105
Header block (ICB)	106
Templates	106
Segment table block	106
BAM blocks	107
Index blocks	108
Database Unload Utility for a RACF Database (IRRDBU00)	119
Block Update command for a RACF database (BLKUPD).	120
Chapter 5. Error recovery for RACF Remote Sharing Facility (RRSF)	137
Types of errors in an RRSF environment	138
Definition errors	138
Environmental errors	138
Program errors	139
Transmission and eine errors	139
Handshaking and state changes	139
Connection states of RRSF nodes	139
Connection state changes after a successful TARGET command	141
Actions to recover from an RRSF failure	141
RRSF ESTAE processing	142
Failure of MVS System Service	142
APPC errors	143
Recording of errors	146
Chapter 6. Diagnosis reference for RACF.	149
Parameter list descriptions	149
RACROUTE parameter list	150
AUDIT service parameter list	153
AUTH service parameter list	154
DEFINE service parameter list.	158
DIRAUTH Service Parameter List	164
EXTRACT service parameter list	164
FASTAUTH service parameter list	167
LIST service parameter list	168
SIGNON service parameter list	169
STAT service parameter list.	170
TOKENBLD service parameter list	170
TOKENMAP/TOKENXTR service parameter list	174
VERIFY/VERIFYX service parameter list	175
ICHEINTY parameter list.	179
Process flows for RACF	182
Process flow for RACF commands	182
Process flow for RACF directed commands	183
Process flow for RACF macros	184

Process flow for RACF installation exits	185
Process flow for RACF utilities.	187
Process flow for the RACF Report Writer.	188
Process flow for SMF Data Unload Utility (IRRADU00).	189
Process flow for IMS use of RACF	189
Process flow for RACF Callable Services.	190
Error recording for Callable Services	190
Variable data recorded by RACF Callable Services	191
Control Block overviews for RACF	207
RCVT and SAF Router Vector Table	207
ACEE and related Control Blocks	207
SVC dump title descriptions.	208
SVC failure (ICHRST00)	208
RACF initialization failure (ICHSEC02).	210
RACLIST failure (IRRCOP10)	210
RACF COPY RACGLIST failure (IRRRLS12)	211
RACF CREATE RACGLIST failure (IRRRLS13)	212
RACF DELETE RACGLIST failure (IRRRLS14)	212
RACF data space recovery failure (IRRRLS15)	213
RACF subsystem failures (IRRSSC01 and IRRSSS01).	213
Persistent verification failures	214
RACF I/O failures	214
RACF index block error	215
Dump title description for Callable Services	215
Dump titles for the RACF/DB2 External Security Module	216
RACF/DB2 External Security Module diagnostic information	216
VRA keys provided by RACF for some abends.	217
Front-ending RACF commands	219
Command processing changes	219
Considerations if writing a command front-end processor	220
The DEBUG command	221
Chapter 7. Error recovery for RACF sysplex data sharing	223
Actions to recover from a coupling facility error	223
Appendix A. The Inventory Control Block (ICB)	225
Constants	233
Cross Reference.	233
Appendix B. The Security Product Trace Area (SAFT)	239
Appendix C. Accessibility	243
Using assistive technologies	243
Keyboard navigation of the user interface.	243
Notices	245
Programming interface information	246
Trademarks.	247
Index	249

I

Figures

1. Trace Output Showing a Problem in the Command Processor or RACF	50
2. Sample Proc 1: GTFRACF	52
3. Sample Parmlib Member: GTFPRM#O	52
4. Information to Gather before Calling IBM with Abend Problems	98
5. Information to Gather before Calling IBM with Documentation Problems	98
6. Information to Gather before Calling IBM with Output Problems	99
7. Information to Gather before Calling IBM with Logon Problems	100
8. Information to Gather before Calling IBM with Loop Problems	101
9. Information to Gather before Calling IBM with Message Problems	101
10. Information to Gather before Calling IBM with Performance Problems	102
11. Information to Gather before Calling IBM with Return Code Problems	102
12. Information to Gather before Calling IBM with Wait Problems	103
13. Format of the RACF Database	106
14. Block Masks of the RACF Database	108
15. Example of a RACF Index	109
16. Example Overview of a Level-1 Index Block	110
17. Example of an Index Block Header	111
18. Example Overview of an Alias Index Block	112
19. Example of Front-End Compression in an Index Block	113
20. Example of Index Entry for USR26 with a Base, TSO, and DFP Segment	115
21. Example of a Profile Displayed by BLKUPD	119
22. The Relationship between the BLKUPD Command and Its Levels of Subcommands	121
23. Flow of a Directed Command in an RRSF Environment	138
24. RACROUTE Parameter List	151
25. AUDIT Service Parameter List	153
26. AUTH Service Parameter List	154
27. DEFINE Service Parameter List	158
28. DIRAUTH Service Parameter List	164
29. EXTRACT Service Parameter List	164
30. FASTAUTH Service Parameter List	167
31. LIST Service Parameter List	168
32. SIGNON Service Parameter List	169
33. STAT Service Parameter List	170
34. TOKENBLD Service Parameter List	170
35. TOKENMAP/TOKENXTR Service Parameter List	174
36. VERIFY/VERIFYX Service Parameter List	175
37. ICHEINTY Parameter List	179
38. Process Flow for RACF Commands	182
39. Process Flow for RACF Directed Commands	183
40. Process Flow for RACF Macros	184
41. Process Flow for RACF Installation Exits	185
42. Process Flow for RACF Cross-Reference and Database Unload Utilities	187
43. Process Flow for RACF Remove ID Utility	187
44. Process Flow for Other RACF Utilities	187
45. Process Flow for RACF Report Writer	188
46. Process Flow for SMF Data Unload Utility	189
47. Process Flow for IMS Use of RACF	189
48. Process Flow for RACF Callable Services	190
49. An Example of a Symptom Record when an SNAME is not found in the alias index entry but is found in the mapping profile	193
50. An Example of a Symptom Record when a UID is not found in the alias index entry but is found in the mapping profile	195
51. An Example of a Symptom Record when the Callable Service Cannot Communicate with RACF	204

52. An Example of a Symptom Record when a Command Fails	206
53. Control Block Overview: RCVT and SAF Router Vector Table	207
54. Control Block Overview: ACEE in a Single-User Address Space	208
55. Control Block Overview: ACEE in a Multiple-User Address Space	208
56. Control Block Overview: ACEEs When Third-Party AUTH Request Is Used	208
57. Sample Symptoms for RACF (DAEDATA Output)	218
58. Sample SDWA for RACF	219

Tables

1. Determining Whether You Have a RACF Problem	2
2. Index to Troubleshooting Tables for RACF	8
3. Troubleshooting Table: Abends.	10
4. Troubleshooting Table: Documentation	19
5. Troubleshooting Table: Incorrect Output	20
6. Troubleshooting Table: Logon Problems	28
7. Troubleshooting Table: Loops	29
8. Troubleshooting Table: Messages.	29
9. Troubleshooting Table: Performance Problems	31
10. Troubleshooting Table: Return Codes	33
11. Troubleshooting Table: Waits	34
12. Preliminary Search Symptoms for RACF	36
13. Examples of Search Arguments for RACF	38
14. RACF FMIDs	39
15. RMID Levels, yyy and zzzzz Values for Example 1	45
16. RMID Levels, yyy and zzzzz Values for Example 2	47
17. Additional Search Symptoms for RACF	79
18. Segment Identifiers	115
19. Connection States between Nodes	139
20. Table of New Connection States Based on a Successful TARGET Command	141
21. Contents of Primary Symptom String for a RACF Subsystem Address Space Error	147
22. Contents of Secondary Symptom String for a RACF Subsystem Address Space Error	147
23. Potential Contents of Variable Symptom String for a RACF Subsystem Address Space Error	148
24. Additional LOGREC Data for a RACF Subsystem Address Space Error	148
25. Cross-Reference for RACROUTE REQUEST=type, the Independent RACF System Macros, and the Parameter List Name	149
26. Contents of Primary Symptom String for a Callable Service Error	191
27. Contents of Secondary Symptom String for a Callable Service Error	191
28. Additional LOGREC Data for a Callable Service Error.	191
29. Failing dataspace layer for an internal subroutine identifier	198
30. Failing system service for a failing system service identifier.	199

About this document

This document contains information about the Security Server for z/OS and z/OS.e, which consists of these components:

- Resource Access Control Facility (RACF)
- DCE Security Server
- z/OS Firewall Technologies
- Lightweight Directory Access Protocol (LDAP) Server
- Open Cryptographic Services Facility
- Security Server Network Authentication Service
- PKI Services

For information about the other components, see the documents related to those components.

This document provides information that is useful for diagnosing problems in the RACF® program product, such as:

- Parameter list descriptions
- Process flows
- Control block overviews
- SVC dump title descriptions
- A description of variable recording area (VRA) keys provided by RACF

The information included in this document should help you to:

- Follow diagnostic procedures for each type of problem in RACF
- Collect and analyze data needed to diagnose the problem
- Develop a search argument to be used for searching problem-reporting databases
- Gather the necessary problem data before reporting the problem to IBM

In addition, this document describes how to use the BLKUPD command to correct problems in the RACF database.

Who should use this document

This document is for anyone who diagnoses problems that appear to be caused by RACF and for RACF system programmers who intend to use the BLKUPD command to correct problems in the RACF database.

This document assumes that you:

- Understand basic system concepts and the use of system services
- Code in assembler language and read assembler and linkage editor output
- Understand the commonly used diagnostic tasks and aids, such as message logs, system dumps, and the interactive problem control system (IPCS)
- Understand the externals for RACF

How to use this document

Before using this document, collect the following problem data:

- The problem type, such as an abend
- An indication that the problem was caused by RACF

How to use this document

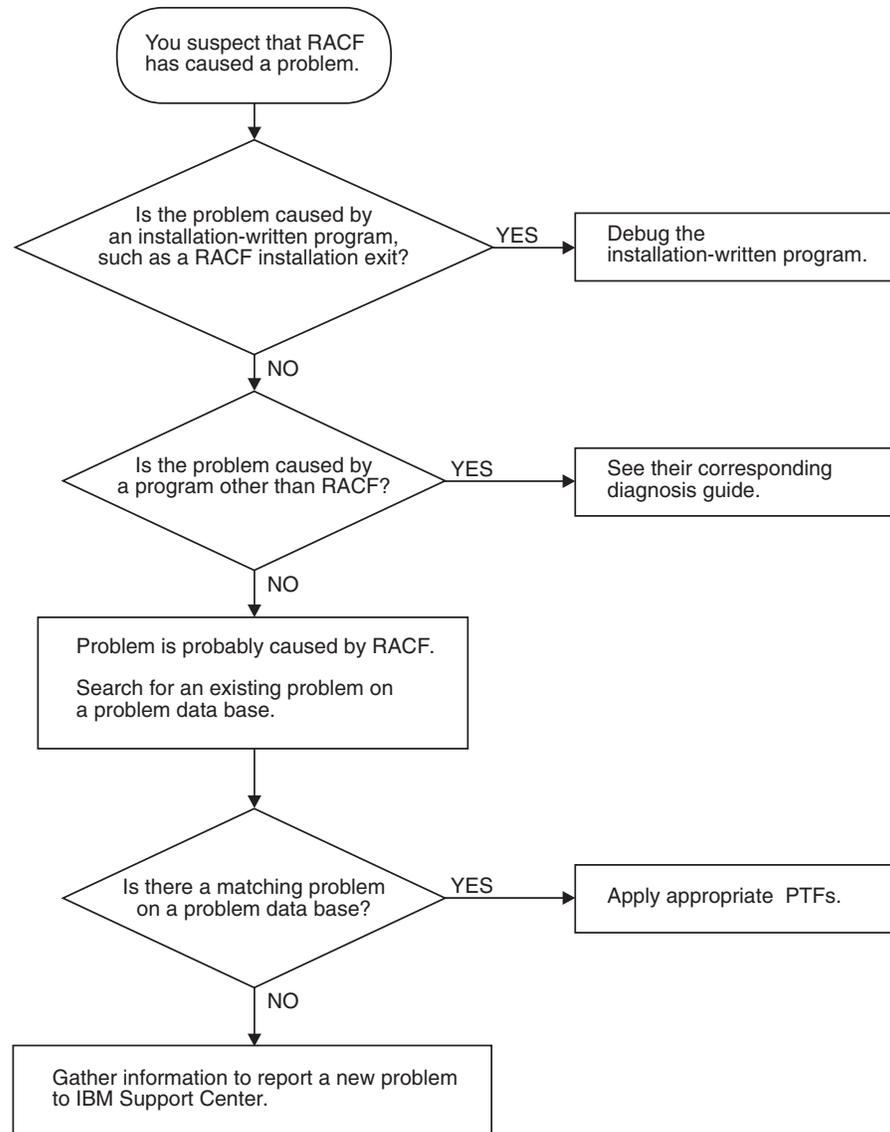
If you do not have this data, see the problem determination and diagnosis publications for your system and perform the recommended procedures.

Use this document to diagnose problems in RACF only. If the problem is not caused by RACF, return to your system diagnosis guide to identify the failing component or program product.

Use this document to diagnose problems in RACF as follows:

1. Identify the problem type.
2. Collect problem data.
3. Analyze the problem data to develop symptoms.
4. Develop search arguments, search problem-reporting databases, and request the problem fix if the problem has been reported before. If not, continue diagnosis.
5. Collect additional problem data.
6. Analyze the problem data to isolate the problem.
7. Report the problem to IBM if assistance is needed or if the problem is new.

The following flowchart illustrates the possible paths to be taken during problem analysis while using this document.



Where to find RACF information

For general RACF information, see the RACF web site at:
<http://www.ibm.com/servers/eserver/zseries/zos/racf/>

For more detailed RACF information, see *z/OS Security Server RACF System Programmer's Guide*. For help in gathering information about your RACF installation, see your RACF security administrator and RACF auditor or see *z/OS Security Server RACF Security Administrator's Guide* and *z/OS Security Server RACF Auditor's Guide*.

For the syntax, return codes, and error reason codes for RACF macros, see *z/OS Security Server RACF Macros and Interfaces* except for the RACROUTE macro, which is described in *z/OS Security Server RACROUTE Macro Reference*.

For the mappings of RACF control blocks (such as the RCVT and the ACEE), see *z/OS Security Server RACF Data Areas*.

Finding RACF information

Where to find more information

Where necessary, this document references information in other publications. For complete titles and order numbers for all elements of z/OS™, see *z/OS Information Roadmap*.

Softcopy publications

The RACF library is available on the following CD-ROMs. The CD-ROM online library collections include Library Reader™, which is a program that enables you to view the softcopy documents.

SK3T-4269 *z/OS Version 1 Release 4 Collection*

This collection contains the set of unlicensed documents for the current release of z/OS in both BookManager® and Portable Document Format (PDF) files. You can view or print the PDF files with the Adobe Acrobat reader.

SK3T-4272 *z/OS Security Server RACF Collection*

This softcopy collection kit contains the Security Server library for z/OS in both BookManager and Portable Document Format (PDF) files. You can view or print the PDF files with the Adobe Acrobat reader.

SK2T-2180 *Online Library OS/390 Security Server RACF Information Package*

This softcopy collection contains the Security Server library for OS/390. It also contains the RACF/MVS Version 2 product libraries, the RACF/VM 1.10 product library, product documents from the OS/390® and VM collections, International Technical Support Organization (ITSO) documents (known as Redbooks™), and Washington System Center (WSC) documents (known as orange books) that contain information related to RACF. The collection does not contain any licensed publications. By using this CD-ROM, you have access to RACF-related information from IBM products such as OS/390, VM/ESA®, CICS®, and NetView®.

SK3T-7876 *IBM eServer zSeries™ Redbooks Collection*

This softcopy collection contains a set of documents called Redbooks that pertain to zSeries subject areas ranging from e-business application development and enablement to hardware, networking, Linux, solutions, security, Parallel Sysplex® and many others.

SK2T-2177 *IBM Redbooks S/390® Collection*

This softcopy collection contains a set of documents called Redbooks that pertain to S/390 subject areas ranging from application development and enablement to hardware, networking, security, Parallel Sysplex and many others.

RACF courses

The following RACF classroom courses are available:

ES840 *Implementing RACF Security for CICS/ESA® and CICS/TS*

H3917 *Basics of OS/390 Security Server RACF Administration*

H3927 *Effective RACF Administration*

ES88A *Exploiting the Features of OS/390 Security Server RACF*

Finding RACF information

IBM provides a variety of educational offerings for RACF. For more information about classroom courses and other offerings, do any of the following:

- See your IBM representative
- Call 1-800-IBM-TEACH (1-800-426-8322)

Using LookAt to look up message explanations

LookAt is an online facility that allows you to look up explanations for most messages you encounter, as well as for some system abends and codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can access LookAt from the Internet at:

<http://www.ibm.com/eserver/zseries/zos/bkserv/lookat/>

or from anywhere in z/OS where you can access a TSO/E command line (for example, TSO/E prompt, ISPF, z/OS UNIX System Services running OMVS). You can also download code from the *z/OS Collection* (SK3T-4269) and the LookAt Web site that will allow you to access LookAt from a handheld computer (Palm Pilot VIIx suggested).

To use LookAt as a TSO/E command, you must have LookAt installed on your host system. You can obtain the LookAt code for TSO/E from a disk on your *z/OS Collection* (SK3T-4269) or from the **News** section on the LookAt Web site.

Some messages have information in more than one document. For those messages, LookAt displays a list of documents in which the message appears.

Accessing z/OS licensed documents on the Internet

z/OS licensed documentation is available on the Internet in PDF format at the IBM Resource Link™ Web site at:

<http://www.ibm.com/servers/resourceLink>

Licensed documents are available only to customers with a z/OS license. Access to these documents requires an IBM Resource Link user ID and password, and a key code. With your z/OS order you received a Memo to Licensees, (GI10-0671), that includes this key code.¹

To obtain your IBM Resource Link user ID and password, log on to:

<http://www.ibm.com/servers/resourceLink>

To register for access to the z/OS licensed documents:

1. Sign in to Resource Link using your Resource Link user ID and password.
2. Select **User Profiles** located on the left-hand navigation bar.

Note: You cannot access the z/OS licensed documents unless you have registered for access to them and received an e-mail confirmation informing you that your request has been processed.

Printed licensed documents are not available from IBM.

You can use the PDF format on either **z/OS Licensed Product Library CD-ROM** or IBM Resource Link to print licensed documents.

1. z/OS.e™ customers received a Memo to Licensees, (GI10-0684) that includes this key code.

Finding RACF information

IBM systems center publications

IBM systems centers produce documents known as red and orange books that can help you set up and use RACF. These documents have not been subjected to any formal review nor have they been checked for technical accuracy, but they represent current product understanding (at the time of their publication) and provide valuable information on a wide range of RACF topics. They are not shipped with RACF; you must order them separately. A selected list of these documents follows. Other documents are available, but they are not included in this list, either because the information they present has been incorporated into IBM product manuals or because their technical content is outdated.

G320-9279	<i>Systems Security Publications Bibliography</i>
GG22-9396	<i>Tutorial: Options for Tuning RACF</i>
GG24-3378	<i>DFSMS and RACF Usage Considerations</i>
GG24-3451	<i>Introduction to System and Network Security: Considerations, Options, and Techniques</i>
GG24-3524	<i>Network Security Involving the NetView Family of Products</i>
GG24-3970	<i>Elements of Security: RACF Overview - Student Notes</i>
GG24-3971	<i>Elements of Security: RACF Installation - Student Notes</i>
GG24-3972	<i>Elements of Security: RACF Advanced Topics - Student Notes</i>
GG24-3984	<i>RACF Macros and Exit Coding</i>
GG24-4282	<i>Secured Single Signon in a Client/Server Environment</i>
GG24-4453	<i>Enhanced Auditing Using the RACF SMF Data Unload Utility</i>
GG26-2005	<i>RACF Support for Open Systems Technical Presentation Guide</i>
GC28-1210	<i>System/390[®] MVS[™] Sysplex Hardware and Software Migration</i>
SG24-4704	<i>OS/390 Security Services and RACF-DCE Interoperation</i>
SG24-4820	<i>OS/390 Security Server Audit Tool and Report Application</i>
SG24-5158	<i>Ready for e-business: OS/390 Security Server Enhancements</i>
SG24-5339	<i>The OS/390 Security Server Meets Tivoli[®]: Managing RACF with Tivoli Security Products</i>

Other sources of information

IBM provides customer-accessible discussion areas where RACF may be discussed by customer and IBM participants. Other information is also available through the Internet.

IBM discussion areas

IBM provides *ibm.servers.mvs.racf* newsgroup for discussion of RACF-related topics. You can find this newsgroup on news (NNTP) server *news.software.ibm.com* using your favorite news reader client.

Internet sources

The following resources are available through the Internet to provide additional information about the RACF library and other security-related topics:

- **Online library**

To view and print online versions of the z/OS publications, use this address:

<http://www.ibm.com/servers/eserver/zseries/zos/bkserv/>

- **Redbooks**

The documents known as Redbooks that are produced by the International Technical Support Organization (ITSO) are available at the following address:

<http://www.ibm.com/redbooks/>

- **Enterprise systems security**

Finding RACF information

For more information about security on the S/390 platform, OS/390, and z/OS, including the elements that comprise the Security Server, use this address:

<http://www.ibm.com/servers/eserver/zseries/zos/security/>

- **RACF home page**

You can visit the RACF home page on the World Wide Web using this address:

<http://www.ibm.com/servers/eserver/zseries/zos/racf/>

- **RACF-L discussion list**

Customers and IBM participants may also discuss RACF on the RACF-L discussion list. RACF-L is not operated or sponsored by IBM; it is run by the University of Georgia.

To subscribe to the RACF-L discussion and receive postings, send a note to:

listserv@listserv.uga.edu

Include the following line in the body of the note, substituting your first name and last name as indicated:

```
subscribe racf-l first_name last_name
```

To post a question or response to RACF-L, send a note, including an appropriate Subject: line, to:

racf-l@listserv.uga.edu

- **Sample code**

You can get sample code, internally-developed tools, and exits to help you use RACF. This code works in our environment, at the time we make it available, but is not officially supported. Each tool or sample has a README file that describes the tool or sample and any restrictions on its use.

To access this code from a Web browser, go to the RACF home page and select the “Downloads” topic from the navigation bar, or go to <ftp://ftp.software.ibm.com/eserver/zseries/zos/racf/>.

The code is also available from [ftp.software.ibm.com](ftp://ftp.software.ibm.com) through anonymous FTP. To get access:

1. Log in as user **anonymous**.
2. Change the directory, as follows, to find the subdirectories that contain the sample code or tool you want to download:

```
cd eserver/zseries/zos/racf/
```

An announcement will be posted on the RACF-L discussion list and on newsgroup ibm.servers.mvs.racf whenever something is added.

Note: Some Web browsers and some FTP clients (especially those using a graphical interface) might have problems using [ftp.software.ibm.com](ftp://ftp.software.ibm.com) because of inconsistencies in the way they implement the FTP protocols. If you have problems, you can try the following:

- Try to get access by using a Web browser and the links from the RACF home page.
- Use a different FTP client. If necessary, use a client that is based on command line interfaces instead of graphical interfaces.
- If your FTP client has configuration parameters for the type of remote system, configure it as UNIX[®] instead of MVS.

Finding RACF information

Restrictions

Because the sample code and tools are not officially supported,

- There are no guaranteed enhancements.
- No APARs can be accepted.

To request copies of IBM publications

Direct your request for copies of any IBM publication to your IBM representative or to the IBM branch office serving your locality.

There is also a toll-free customer support number (1-800-879-2755) available Monday through Friday from 6:30 a.m. through 5:00 p.m. Mountain Time. You can use this number to:

- Order or inquire about IBM publications
- Resolve any software manufacturing or delivery concerns
- Activate the program reorder form to provide faster and more convenient ordering of software updates

Summary of changes

Summary of changes for GA22-7689-03 z/OS Version 1 Release 4

The document contains information previously presented in GA22-7689-02, which supports z/OS Version 1 Release 3.

New information

- Information has been added to indicate this document supports z/OS.e.
- A new appendix has been added: The Security Product Trace Area (SAFT).
- New information has been added under "Other sources of information."
- New information has been added to Chapter 6 about error recording for R_PKIserv (CSECT IRRRPX07).
- The appendix for the Inventory Control Block has been updated with a new constant representing HRF7707 for ICBVRMN field #.

This document includes terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Starting with z/OS V1R2, you may notice changes in the style and structure of some content in this document—for example, headings that use uppercase for the first letter of initial words only, and procedures that have a different look and format. The changes are ongoing improvements to the consistency and retrievability of information in our documents.

Summary of changes for GA22-7689-02 z/OS Version 1 Release 3

The document contains information previously presented in GA22-7689-01, which supports z/OS Version 1 Release 2.

New information

- The SET command Callable Services table now supports IRRSCL00 for Access Control Lists
- A new section has been added for using SAF Trace to debug SSL problems.
- New information has been added to the "Variable data recorded by RACF Callable Services" section.

Changed information

- The Callable Services Table for the SET command has been modified to identify the callable services correctly.

This document includes terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Summary of changes for GA22-7689-01 z/OS Version 1 Release 2

Summary of changes

The document contains information previously presented in GA22-7689-00, which supports z/OS Version 1 Release 1.

New information

- Added new return code information in the InitACEE(CSECT IRRRIA00).
- Added new information on obtaining a GTF trace when tracing the Callable Services, RACROUTE, and RACF Database Manager Request Calls.
- Updated ICHPICB mapping for SETROPTS KERBLVL indicator ICBKRBLV.
- Added new constant representing HRF7705 for ICBVRMN field.
- Added new cross reference entry for ICBKRBLV.

Changed information

- Definition of "Obtaining Trace Records Using the SET TRACE Command."

This document contains terminology, maintenance, and editorial changes, including changes to improve consistency and retrievability.

Chapter 1. Starting diagnosis

This chapter contains diagnostic procedures that you can perform with problem data that is quick and easy to obtain. It includes:

- “Planning for problem diagnosis”
- “Troubleshooting the problem”
- “Performing a preliminary search for a matching problem” on page 34

Planning for problem diagnosis

Consider making the following preparations for diagnosis before you use RACF:

- Install and operate RACF so that you get adequate problem data (such as messages and dumps) when problems occur.
- Provide *timely* and *complete* backups of the RACF database.
- Obtain access to a RACF user with the SPECIAL attribute.
- Reserve a RACF user ID with the SPECIAL attribute for use **only after logon problems are resolved**. For example, if all users logging on are, through an error, revoked when logging on, then even the system security administrator could be revoked when logging on. After the problem is corrected, the system security administrator could then log on with the user ID that is still active and activate the other user IDs.
- Obtain messages that have been sent to the system console or the security console.
- Prevent common problems by using RACF macros and utilities. See the recommendations in “Utilities:” on page 3.
- Correct any problems that were caused while using RACF profiles and options. See *z/OS Security Server RACF Security Administrator’s Guide*.

Troubleshooting the problem

The following subsections describe the RACF information you will need to trouble shoot your problem.

- “**Diagnosis hints**” on page 2.

This section includes:

- How to make sure the problem is in RACF
- How to prevent some common programming errors in RACF macros and utilities

- “**Troubleshooting tables for problems in RACF**” on page 7.

These tables provide steps to follow in diagnosing each type of symptom, such as abend, message, or incorrect output.

- “**Performing a preliminary search for a matching problem**” on page 34.:

This section tells you how to search a database for a matching problem.

Note to the Reader

Chapter 4, “Troubleshooting your RACF database” on page 105 describes how to use the BLKUPD command. The skills used in working with the BLKUPD command are different from the skills used in general troubleshooting for suspected RACF problems.

Troubleshooting

Diagnosis hints

This section provides advice on making sure that this is a problem with RACF and describes special types of problems that you might be able to fix without calling IBM.

If the recommendations that follow do not solve the problem, you need to follow the other diagnosis procedures described in the troubleshooting tables.

Making sure this is a RACF problem:

Table 1 helps you make sure the problem is in RACF, rather than in either the caller of RACF or a system service used during processing of a RACF request.

For some problems, you might be able to do a quick check of the problem symptoms in the dump (if present), the job and system message log, SYS1.LOGREC, trace records, or other problem output.

Table 1. Determining Whether You Have a RACF Problem

Questions	Recommendations
Was there a <i>valid</i> request for a RACF function?	<p>This could be that:</p> <ul style="list-style-type: none">• A RACF macro was invoked• A RACF utility was invoked• A RACF command was invoked• A user selected a RACF option on an ISPF panel <p>The RACF request <i>must be valid</i>. A user request could invoke a routine that in turn invokes RACF. A RACF error message (like ICH408I, insufficient access authority) would then be issued not because of a RACF error or because of an error made by the original user, but because of the routine that invoked RACF.</p> <p>Note: If there is a system dump, you can check this in the trace records recorded in the dump. If there is no system dump, you may need to recreate the problem and request a system dump when the problem reoccurs.</p>
Were error messages issued by system services that were used during RACF processing?	<p>Check whether any error messages were issued for the user request, and make sure that message IDs are included with the messages.</p> <p>If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options specified: PROFILE WTPMSG MSGID.</p>
Did RACF return control to the program that made the request?	<p>For RACF macros and utilities: if there is a system dump, you can check this in the trace records recorded in the dump or (if an SVC was issued) in the RB chain in the system dump. If there is no system dump, you may need to recreate the problem and request a system dump when the problem reoccurs. For batch jobs, you can also check whether the job step for the program completed with a zero return code. (If an application program made the request, the TSO TEST command, a SLIP command issued by the system operator, or a WTO or PTRACE macro added to the program could be helpful in checking the execution steps within the program.)</p>

Note: While diagnosing the problem, you need to continue to check whether something other than RACF might be the source of the problem. Possible candidates are:

- Callers of RACF
- System services used by RACF
- A hardware error
- A program that overlaid storage used by RACF, its caller, or a system service

- A storage shortage can cause RACF commands to ABEND unpredictably

Common usage problems with RACF macros and utilities:

This section provides advice for resolving problems that might result when using the RACF macros and utilities. The problems described here might appear at first to be errors in RACF.

Note: Advice for resolving coding problems is in *z/OS Security Server RACF System Programmer's Guide*.

Utilities:

This section provides describes typical errors for RACF utilities and advice on action to take to resolve the problem.

IRRUT100 Utility

Error: Assuming the utility is in a loop because it runs a long time. This utility reads every profile in the RACF database and usually takes a long time to run.

Action: Run the utility when the system is not heavily used and allow it to continue running until completion.

IRRUT200 Utility

Error: Assuming the RACF database contains no errors because the utility runs without error. The utility will not find all errors on a RACF database. Errors may exist within profiles and could result in message IRR407I.

```
RACF DATA SET INDEX ERROR. xxx
RACF DATA SET SEQUENCE nnn, dsname SEARCH ON entry-name
```

where *xxx* is PRIMARY or BACKUP, *nnn* is the database sequence number, *dsname* is the data set name, and *entry-name* is the type of entry.

Action: If the utility does not find any errors, list the profiles involved using the appropriate RACF command. Look for error messages such as NO CONNECT ENTRY FOUND or incorrect data in fields such as OWNER.

Use the RACF commands to list and correct the profiles, if possible. If the commands fail, use BLKUPD to correct or delete the profiles.

RACF Sysplex Data Sharing

If RACF is enabled for sysplex communication and the system is operating in read-only mode, you cannot use BLKUPD to update the RACF database.

You can, however, run BLKUPD from another system (in the same data sharing group) that is not in read-only mode.

Error: Running the utility against an active output database. Even if there are no other users on the system, other system tasks and applications may be accessing the RACF database. If any changes are made to the database, the output of the utility will not be reliable.

Troubleshooting

- Action:** Enter the RVARY INACTIVE or RVARY SWITCH command before running the utility.
- Error:** Assuming the run of the utility failed because a nonzero return code was received.
- Action:** The return code returned is the highest return code encountered while processing the RACF database. A nonzero return code does not mean the utility failed. See *z/OS Security Server RACF Messages and Codes* for details.

IRRUT400 Utility

- Error:** Do not use this utility to merge RACF databases from separate systems.
- Action:** Use it only for merging back together a database from one system.
- Error:** Ignoring return code 4 or return code 8 on IRRUT400 MERGE. These return codes can indicate that duplicate profiles were found. Ignoring them can result in profile conflicts.
- Action:** Check the duplicate profiles on each of the input databases to determine which ones are desired on the output database. Use the RACF commands to delete the unwanted ones and rerun the IRRUT400 MERGE.
- Error:** Running the utility against an active RACF database. Even if there are no other users on the system, other system tasks and applications may be accessing the RACF database. If any changes are made to the database, the output of the utility will not be reliable.
- Action:** Enter the RVARY INACTIVE or RVARY SWITCH command before running the utility.
- Error:** RACF manager return code X'50' (decimal 80) received while trying to access the RACF database. This return code means that one of the following occurred:
- You attempted to update a RACF database that has had the utility run against it with the LOCKINPUT keyword specified.
 - RACF is enabled for sysplex communication and while running in read-only mode, you tried to update the RACF database.
- Action:** The LOCKINPUT keyword makes the input database unusable for system updates. It should be used with caution.
- If your RACF database is locked, and you want to unlock it, use the UNLOCKINPUT parameter of IRRUT400 or IRRDBU00.
- Note:** If this error occurs because your RACF sysplex data sharing system is in read-only mode, UNLOCKINPUT will not correct the problem. You cannot update the RACF database when your system is operating in read-only mode.

IRRDBU00 Utility

- Error:** RACF manager return code X'50' (decimal 80) received from another task while trying to access the RACF database. This return code means that one of the following has occurred:

Troubleshooting

- A task attempted to update the RACF database while the IRRDBU00 utility was running against the database with the LOCKINPUT keyword specified.
- RACF is enabled for sysplex communication and was operating in read-only mode, when a task tried to update the RACF database.

Action: A task cannot update the database shared by a sysplex data sharing group when the system is operating in read-only mode. If, however, the utility is running with LOCKINPUT specified, do one of the following:

- Wait until the utility is finished running.
- Run the utility at another time when updates are *not* needed.
- Run the utility against a copy of the RACF database—not against the active database.

Note: The LOCKINPUT keyword makes the input database for the utility temporarily unusable for system updates. It should be used with caution.

Error: I/O error while reading the database; your data set has slipped into secondary extents. The following console messages appear:

```
13.31.20 JOB00019 *IRR401I 500 ABEND DURING RACF PROCESSING OF
                    NEXT REQUEST FOR ENTRY MURPHYB
13.31.20 JOB00019  IRR401I 500 ABEND DURING RACF PROCESSING
```

The following messages appear from SYSPRINT:

```
IRR67122I *** Utility ESTAE error routine in control. ***
IRR67124I Profile processing DID NOT finish before the abend.
                    Output is NOT complete.
IRR67120I 500 abend during utility processing. Reason code 0000.
IRR67125I Utility ESTAE error routine will now attempt clean-up
                    processing.
IRR67121I The module in control at time of abend was IRRDBU03.
```

Action: Reallocate the database that is causing the problem as a single extent. Recopy the data.

Error: Not all of your data is unloaded. Entire classes are missing.

Action: If you have imported a database from another system, you must use the class descriptor table from that system. IPL your system with the class descriptor table associated with the imported database.

Error: Fields are missing or field offsets are incorrect in the output database.

Action: Ensure that you have the current level of templates for the input database. Run IRRMIN00 with PARM=UPDATE and the current level of templates.

IRRRID00 Utility

Error: The RACF remove ID utility (IRRRID00) does not issue any user abends. If a user abend is received, it was issued by a called service such as DFSORT™.

Action: If you see a user abend, consult the documentation for the called service.

Troubleshooting

RACF Report Writer Utility (RACFRW)

Error: The RACF report writer utility (RACFRW) does not issue any user abends. If a user abend is received, it was issued by a called service such as SORT.

Action: If you see a user abend, consult the documentation for the called service.

IRRIRA00

Error: If the utility runs for a long period of time it is considered to be "in a loop". When going from stage 0 to stage 1 (which can take a considerable amount of time), IRRIRA00 reads every mapping profile for the application identity mapping fields in the RACF database. It then reads the base profile named by the mapping profile to verify that the base profile-alias correlation is valid, and also to verify every user and group profile with an OMVS segment. For every valid correlation found, the alias index entry must be maintained. Additionally, when going from stage 2 to stage 3 (which can take a considerable amount of time), all application identity mapping profiles in the RACF database are deleted.

Action: Run the utility when the system is not being heavily used, and allow it to continue running through completion.

RACF macros:

This section provides describes typical errors for RACF macros and advice on action to take to resolve the problem.

General

Error: Unexpected return code or incorrect output when using the list and execute form of a macro. Results are not the same as for standard form.

Action:

1. Check that the list form is in a CSECT, not a DSECT. If the list form is only in a DSECT, the parameter list will not be initialized.
2. Check that the list form was copied over correctly into the GETMAIN work area.
3. Make sure the LIST and EXECUTE forms of the RACROUTE macro specify the same value for the RELEASE= parameter.

Error: Incorrect output from a macro with some keywords that were ignored.

Action: If the macro is continued on a second line, check that there is a continuation marked in column 72 and that the second line begins in column 16. If the macro is continued in column 17 or later, the assembler will ignore that line.

ICHEINTY Macro

Error: Incorrect output on an ICHEINTY macro when looking at discrete or generic profiles.

Action: Check the meaning of the GENERIC keyword. This keyword refers to the encoding of the resource name. It does not correspond to the type of profile returned. If the generic profile was retrieved, the

high-order bit will be on at offset X'A' in the work area specified in the ICHEINTY macro. It will be off if a discrete profile was returned.

- Error:** Difficulties while using the ICHEINTY macro.
- Action:** Read the documentation of the macro very carefully. The ICHEINTY macro and its related macros are quite complex. They bypass exits, naming conventions, authorization checking, and do little parameter validation. They are recommended only when there is no other way of accomplishing the desired task (no command or utility that will do the same thing). Note that in some cases, the RACXTRT macro can be used instead of the ICHEINTY macro.
- Error:** Message IRR401I reporting a DEQ abend (such as abend 730) or abend 0C4 in IRRMRT00 on an ICHEINTY macro.
- Action:** Check the specification of ENTRY or ENTRYX. This should point to a 1-byte length followed by the ENTRY or ENTRYX NAME. If the length is zero, or if it points directly to the ENTRY or ENTRYX name, an overlay occurs, resulting in the abend.

RACROUTE Macro

- Error:** Abend 282-64 (decimal 100) on RACROUTE REQUEST=AUTH macro with ACEE (accessor environment element) keyword, or abend 283-4C (decimal 76) on RACROUTE REQUEST=VERIFY DELETE with ACEE keyword.
- Action:** Check the specification of the ACEE keyword. On a REQUEST=VERIFY, the ACEE keyword specifies a pointer to the address of the ACEE. On a REQUEST=AUTH, the ACEE keyword specifies a pointer to the ACEE.
- Error:** Return code 4, abend 282-20 (DECIMAL 32), or abend 0C4 during parameter validation on RACROUTE REQUEST=AUTH macro.
- Action:** Check the specification of the ENTITY keyword. If a variable name is specified, it requires one set of parentheses. If a register is used, it requires two sets of parentheses, as in ENTITY=((R4)).

Troubleshooting tables for problems in RACF

You need to be familiar with RACF's basic concepts and functions in order to use the troubleshooting tables. If you need more information, see "Where to find RACF information" on page xiii.

The troubleshooting tables that follow can help you:

- Select the type of problem that most closely matches your problem
- Follow procedures to diagnose each type of problem
- Determine the symptoms to use to search for a matching problem
- Collect the information you need if you report the problem to IBM

Using the troubleshooting tables

Before you begin: You need to document the problem that you have and how it presents itself

Perform the following steps to use the tables:

Troubleshooting

1. First, determine which type of symptom best describes the problem that you are troubleshooting and locate that type in the first column, **Symptom Type**, in Table 2.

2. If you find a matching symptom type:
 - a. Go to the page listed in the second column, **Refer To Page...**, in Table 2. This is the appropriate troubleshooting table.

 - b. In the appropriate table, locate the specific RACF symptom for the problem (for example, Abends). In the second column, **Recommended Diagnostic Procedures**, in Table 3 on page 10, follow the steps for diagnosing the problem.

3. If the problem has several symptoms, you should look up each symptom in the table. For example, some problems cause an abend and an I/O error message.

Table 2. Index to Troubleshooting Tables for RACF

Symptom Type	Refer To Page...
Abend	9
Documentation error	19
Incorrect output	20
Logon problems	28
Loop	29
Messages	29
Performance degradation	31
Return code from RACF	33
Wait or hang	34

If none of the symptoms in the list matches your problem, try the following diagnostic procedures:

1. Check whether any error messages were issued for the user request and make sure that message IDs are included with the messages.
If a batch job produced the output, check that the job statement had `MSGLEVEL=(1,1)` specified. If a TSO/E user had the problem, check that the user profile had the following options: `PROFILE WTPMSG MSGID`

2. If you find an error message that might relate to the problem, see Table 8 on page 29.

3. If you don't have a system dump for the problem, and you want to request one, see "Obtaining a system dump" on page 41.

4. If you have a system dump for the problem, display or print the symptom record in the dump.

Use the IPCS VERBEXIT LOGDATA and VERBEXIT SYMPTOMS subcommands.

Note: SYMPTOMS has some prerequisite VERBEXITs, such as DAEDATA, which provide the abend and non-abend symptoms for the dump. You can also use the BLSCSCAN CLIST with IPCS to obtain the prerequisites. For details, see *z/OS MVS IPCS User's Guide*.

If the symptom record indicates an abend, loop, or wait, use the corresponding entry in the list of symptom types in Table 2 on page 8.

-
5. If you have SYS1.LOGREC output for the problem, or a dump with LOGDATA output, check the LOGREC records related to the problem. If you have a software LOGREC record for an abend, use Table 3 on page 10.
-

You know you are done when you have matched a system type with the type of problem you are having.

If you still don't have a symptom type,

1. Check the general problem analysis advice in *z/OS MVS Diagnosis: Procedures*.
2. Read the information in "Making sure this is a RACF problem:" on page 2.
3. If you need additional assistance, report the problem to IBM.

Troubleshooting tables:

Abends

Table 3 on page 10 describes abends (abnormal end of task) related to RACF, including:

- **RACF abends**, which are abends that result from using RACF functions and that could occur under any operating system
- **MVS abends**, which are abends that MVS system services issue and that are unique to MVS

For RACF abends, the first digit indicates the type of problem, as shown in the table, and the second and third digits together indicate which SVC (supervisor call instruction) was associated with the abend. SVCs occur because a macro was invoked.

- SVC X'82' (in decimal, SVC 130) occurs because a RACHECK macro was invoked independently or by means of a RACROUTE REQUEST=AUTH.
- SVC X'83' (in decimal, SVC 131) occurs because a RACINIT macro was invoked independently or by means of a RACROUTE REQUEST=VERIFY.
- SVC X'84' (in decimal, SVC 132) occurs because a RACLIST macro was invoked independently or by means of a RACROUTE REQUEST=LIST.
- SVC X'85' (in decimal, SVC 133) occurs because a RACDEF macro was invoked independently or by means of a RACROUTE REQUEST=DEFINE.

Abends

Table 3. Troubleshooting Table: Abends

Symptom	Recommended Procedures for Abends
Abends: X'0Cx'	<p>Description: Program exception.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Format the system dump. 2. In the PSW (program status word) in the dump, find the address of the failing instruction (the “next sequential instruction”). 3. The address of the failing instruction should be an address that was available in the dump. Look in the dump for the eye-catcher before the failing instruction. (The hexadecimal values in the dump are usually interpreted along the right side of the dump. In a system dump that contains mostly unprintable characters, a readable name, such as the name of an object module, is easy to see.) The next eye-catcher before a failed instruction should include the name of the object module containing the failing instruction. 4. If the module name begins with ICH or IRR, RACF was executing when the abend occurred. Check the following special cases first: <p>For 0C1 abends:</p> <p>Use AMBLIST LISTLOAD to verify that the failing load module has been properly link-edited.</p> <ul style="list-style-type: none"> • Check the JCLIN as shipped with the RACF product. • Pay particular attention to aliases and entry points. • If IGC0013{ is the failing module, it might not have been properly link-edited. <p>Note: The last character in the load module name is X'C0'.</p> <p>Determine whether the load module has been physically moved since it was link-edited. If the load module is in SYS1.LPALIB:</p> <ol style="list-style-type: none"> a. Link-edit the load module again. b. Re-IPL with CLPA. <p>For 0C4 abends:</p> <p>If the failing module is ICHCLD00, ICHDSM35, IRRRCK00, IRRRIN04, IRRRIN05, IRRRXT00, or IRRFLC00, it is likely that the module is trying to address a CSA or private profile that does not exist.</p> <p>This can happen when a RACROUTE REQUEST=AUTH preprocessing exit passes a return code of 4 or 8 but does not build a CSA or private profile even though the CSA or private option was specified on the AUTH request.</p> <p>To correct this error, correct the RACROUTE REQUEST=AUTH preprocessing exit so that it builds a CSA or private profile when requested on the AUTH request.</p> 5. If these preliminary checks fail, check “Identifying the caller of RACF” on page 75 to see if RACF is the probable cause of the problem or to determine who called the RACF module. <p>Note: To check the parameters actually passed to RACF on a macro request, see “Checking the parameter list passed to RACF” on page 77.</p> 6. If your investigation leads you to think that RACF was the cause of the problem, fill out the Information to Gather before Calling IBM with Abend Problems worksheet in Figure 4 on page 98 and call the IBM support center.

Table 3. Troubleshooting Table: Abends (continued)

Symptom	Recommended Procedures for Abends
Abends: X'182' X'183' X'185'	<p>Description: RACF was unable to establish an ESTAE for the SVC (supervisor call instruction).</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See the message issued with the abend. This could be message IRR401I or ICH409I. Find the abend reason code, if any, in the text for the messages. 2. See <i>z/OS Security Server RACF Messages and Codes</i> for information about the abend code and the accompanying message (if you haven't looked up the explanation already). In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 3. If the information in <i>z/OS Security Server RACF Messages and Codes</i> is not sufficient to correct the problem, do the rest of the steps in this procedure. 4. See "Performing a preliminary search for a matching problem" on page 34. If you do not find a matching problem, you will need to collect problem information to report to IBM, using the steps in the rest of this list. 5. If the abend did not generate a system dump, and the problem is reproducible, obtain a system dump. See "Obtaining a system dump" on page 41. 6. Format the system dump. See "Formatting a system dump" on page 42. 7. You may want to re-create the problem you are investigating (or set up the conditions to allow the problem to reoccur) after setting the trap to obtain the dump. 8. See "Searching for a matching problem" on page 78. 9. If you still do not find a matching problem, see Chapter 3, "Reporting RACF problems to IBM" on page 97.
Abends: X'282' X'283' X'285'	<p>Description: Parameter error on input to the SVC (supervisor call instruction). The reason codes associated with these abends indicate which parameter is bad in the parameter list. The bad parameter was probably set by the caller of RACF.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See the message issued with the abend. This could be message IRR401I or ICH409I. Find the abend reason code, if any, in the text for the messages. 2. If you haven't looked up the explanations already, see <i>z/OS Security Server RACF Messages and Codes</i> for the explanations of the message and the abend code. (Abend codes are also called "completion codes.") Pay particular attention to the reason code associated with the abend. In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 3. If the information in <i>z/OS Security Server RACF Messages and Codes</i> is not sufficient to correct the problem, follow the rest of the steps in this procedure. 4. Check whether any other error messages were issued with the abend messages. These messages might indicate the context in which the abend occurred. In particular, messages preceding the abend message might indicate conditions that caused the abend. Note: If message IDs were not included with the messages and you can re-create the error, do the following: <ul style="list-style-type: none"> • If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. • If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID.

Abends

Table 3. Troubleshooting Table: Abends (continued)

Symptom	Recommended Procedures for Abends
Abends: X'282' X'283' X'285' (continued)	<ol style="list-style-type: none"> 5. Find the name of the calling module. This is the module that issued the RACF request (such as a RACF macro, command, or utility). The conditions set up by this module might have caused the abend. See "Identifying the caller of RACF" on page 75. 6. Find the owner of the module: an IBM product, a non-IBM product, or a user at your installation. If the module name begins with ICH or IRR, it is a RACF module. Continue with this procedure. If the module name begins with the letters A through I, S, or X (but not ICH or IRR), it is probably part of an IBM product, but it is not RACF. See the diagnosis or logic document for the program of which the module is a part. To determine the name of the component that owns the module, use the component summary in <i>z/OS MVS Diagnosis: Reference</i>. 7. See "Performing a preliminary search for a matching problem" on page 34. If you find a matching problem, apply the appropriate PTFs (program temporary fixes). If you do not find a matching problem, you need to collect problem information to report to IBM, using the steps in the rest of this procedure. Please be sure to fill out a blank copy of the worksheet shown in Figure 4 on page 98. 8. If the abend did not generate a system dump, and the problem is reproducible, obtain a system dump. You may want to re-create the problem you are investigating (or set up the conditions to allow the problem to reoccur) after setting the trap to obtain the dump. 9. See "Searching for a matching problem" on page 78. 10. If you still do not find a matching problem, see Chapter 3, "Reporting RACF problems to IBM" on page 97.
Abends: X'382' X'383' X'385'	<p>Description: A user exit associated with an SVC (supervisor call instruction) passed an non-valid return code.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See the message issued with the abend. This could be message IRR401I or ICH409I. 2. If you haven't looked up the explanations already, see <i>z/OS Security Server RACF Messages and Codes</i> for the explanations of the message and the abend code. (Abend codes are also called "completion codes.") Pay particular attention to the explanation of the abend code. In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 3. If the information in <i>z/OS Security Server RACF Messages and Codes</i> is not sufficient to correct the problem, do the rest of the steps in this procedure. 4. Check whether any other error messages were issued with the abend messages. These messages might indicate the context in which the abend occurred. In particular, messages preceding the abend message might indicate conditions that caused the abend. Note: If message IDs were not included with the messages and you can re-create the error, do the following: <ul style="list-style-type: none"> • If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. • If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID.

Table 3. Troubleshooting Table: Abends (continued)

Symptom	Recommended Procedures for Abends
Abends: X'382' X'383' X'385' (continued)	<ol style="list-style-type: none"> 5. Find the name of the calling module. This is the module that issued the RACF request (such as a RACF macro, command, or utility). The conditions set up by this module might have caused the abend. See "Identifying the caller of RACF" on page 75. 6. Find the owner of the module: an IBM product, a non-IBM product, or a user at your installation. If the module name begins with ICH or IRR, it is a RACF module. Continue with this procedure. If the module name begins with the letters A through I, S, or X (but not ICH or IRR), it is probably part of an IBM product, but it is not RACF. See the diagnosis or logic document for the program of which the module is a part. To determine the name of the component that owns the module, use the component summary in <i>z/OS MVS Diagnosis: Reference</i>. 7. See "Performing a preliminary search for a matching problem" on page 34. If you find a matching problem, apply the appropriate PTFs (program temporary fixes). If you do not find a matching problem, you will need to collect problem information to report to IBM, using the steps in the rest of this procedure. Please be sure to fill out a blank copy of the worksheet shown in Figure 4 on page 98. 8. If the abend did not generate a system dump, and the problem is reproducible, obtain a system dump. See "Obtaining a system dump" on page 41. 9. Format the system dump. See "Formatting a system dump" on page 42. 10. You might want to re-create the problem you are investigating (or set up the conditions to allow the problem to reoccur) after setting the trap to obtain the dump. 11. See "Searching for a matching problem" on page 78. 12. If you still do not find a matching problem, see Chapter 3, "Reporting RACF problems to IBM" on page 97.
Abends: X'3C7'	<p>Description: RACF storage manager error during processing of a non-SVC, SRB mode, get space and free space request.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See the message issued with the abend. This could be message ICH409I. Find the abend reason code, if any, in the text for the message. 2. If you haven't looked up the explanations already, see <i>z/OS Security Server RACF Messages and Codes</i> for the explanations of the message and the abend code. (Abend codes are also called "completion codes.") Pay particular attention to the reason code associated with the abend. In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 3. See Chapter 3, "Reporting RACF problems to IBM" on page 97.

Abends

Table 3. Troubleshooting Table: Abends (continued)

Symptom	Recommended Procedures for Abends
Abends: X'400'	<p>Description: This abend is issued by IOS (I/O supervisor) when the RACF database goes into multiple extents. (The RACF database must be allocated in a single contiguous extent.)</p> <p>Action:</p> <ol style="list-style-type: none"> 1. To correct this problem, reallocate the RACF database with enough space to fit in a single extent and re-IPL the system. 2. If this step does not solve the problem, do the rest of the steps in this procedure. 3. See “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, you will need to collect problem information to report to IBM, using the steps in the rest of this list. 4. If the abend did not generate a system dump, and the problem is reproducible, obtain a system dump. See “Obtaining a system dump” on page 41. 5. Format the system dump. See “Formatting a system dump” on page 42. 6. You might want to re-create the problem you are investigating (or set up the conditions to allow the problem to reoccur) after setting the trap to obtain the dump. 7. See “Searching for a matching problem” on page 78. 8. If you still do not find a matching problem, see Chapter 3, “Reporting RACF problems to IBM” on page 97.
Abends: X'482' X'483' X'485'	<p>Description: RACF manager error during SVC (supervisor call instruction) processing.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See the message issued with the abend. This could be message IRR401I or ICH409I. Find the abend reason code, if any, in the text for the messages. 2. See message IRR413I, which occurs with RACF manager abends. Find the RACF manager request ID in the message. 3. See <i>z/OS Security Server RACF Messages and Codes</i> for information about the abend code and the accompanying message (if you haven't looked up the explanation already). In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 4. If the information in <i>z/OS Security Server RACF Messages and Codes</i> is not sufficient to correct the problem, do the rest of the steps in this procedure. 5. See “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, you will need to collect problem information to report to IBM, using the steps in the rest of this list. 6. If the abend did not generate a system dump, and the problem is reproducible, obtain a system dump. See “Obtaining a system dump” on page 41. 7. Format the system dump. See “Formatting a system dump” on page 42. 8. You might want to re-create the problem you are investigating (or set up the conditions to allow the problem to reoccur) after setting the trap to obtain the dump. 9. See “Searching for a matching problem” on page 78. 10. If you still do not find a matching problem, see Chapter 3, “Reporting RACF problems to IBM” on page 97.

Table 3. Troubleshooting Table: Abends (continued)

Symptom	Recommended Procedures for Abends
Abends: X'4C6'	<p>Description: A service call to a RACF module used for z/OS UNIX services did not complete. The specific error is indicated by the abend reason code.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See the message issued with the abend. This could be message ICH409I. Find the abend reason code, if any, in the text for the message. 2. If you haven't looked up the explanations already, see <i>z/OS Security Server RACF Messages and Codes</i> for the explanations of the message and the abend code. (Abend codes are also called "completion codes.") Pay particular attention to the reason code associated with the abend. In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 3. See Chapter 3, "Reporting RACF problems to IBM" on page 97.
Abends: X'4C7'	<p>Description: RACF storage manager error during processing of a non-SVC, task mode, get space and free space request.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See the message issued with the abend. This could be message ICH409I. Find the abend reason code, if any, in the text for the message. 2. If you haven't looked up the explanations already, see <i>z/OS Security Server RACF Messages and Codes</i> for the explanations of the message and the abend code. (Abend codes are also called "completion codes.") Pay particular attention to the reason code associated with the abend. In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 3. See Chapter 3, "Reporting RACF problems to IBM" on page 97.
Abends: X'582' X'585'	<p>Description: Error during SVC (supervisor call instruction) processing. The specific error is indicated by the abend reason code.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See message IRR401I or ICH409I, which occur with RACF abends. Find the abend reason code, if any, in the message text. If the abend reason code is zero, no ACEE (accessor environment element) could be found. Note: This is normal if a job started or a user logged on while RACF was inactive but has since been reactivated. 2. If the abend reason code is not zero, do the rest of the steps in this procedure. 3. If you haven't looked up the explanations already, see <i>z/OS Security Server RACF Messages and Codes</i> for the explanations of the message and the abend code. (Abend codes are also called "completion codes.") Pay particular attention to the reason code associated with the abend. In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 4. If the information in <i>z/OS Security Server RACF Messages and Codes</i> is not sufficient to correct the problem, do the rest of the steps in this procedure. 5. Check whether any other error messages were issued with the abend messages. These messages might indicate the context in which the abend occurred. In particular, messages preceding the abend message might indicate conditions that caused the abend. Note: If message IDs were not included with the messages and you can re-create the error, do the following: <ul style="list-style-type: none"> • If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. • If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID.

Abends

Table 3. Troubleshooting Table: Abends (continued)

Symptom	Recommended Procedures for Abends
Abends: X'582' X'585' (continued)	<ol style="list-style-type: none"> 6. Find the name of the calling module. This is the module that issued the RACF request (such as a RACF macro, command, or utility). The conditions set up by this module might have caused the abend. See "Identifying the caller of RACF" on page 75. 7. Find the owner of the module: an IBM product, a non-IBM product, or a user at your installation. If the module name begins with ICH or IRR, it is a RACF module. Continue with this procedure. If the module name begins with the letters A through I, S, or X (but not ICH or IRR), it is probably part of an IBM product, but it is not RACF. See the diagnosis or logic document for the program of which the module is a part. To determine the name of the component that owns the module, use the component summary in <i>z/OS MVS Diagnosis: Reference</i>. 8. See "Performing a preliminary search for a matching problem" on page 34. If you find a matching problem, apply the appropriate PTFs (program temporary fixes). If you do not find a matching problem, you will need to collect problem information to report to IBM, using the steps in the rest of this procedure. Please be sure to fill out a blank copy of the worksheet shown in Figure 4 on page 98. 9. If the abend did not generate a system dump, and the problem is reproducible, obtain a system dump. See "Obtaining a system dump" on page 41. 10. Format the system dump. See "Formatting a system dump" on page 42. 11. You might want to re-create the problem you are investigating (or set up the conditions to allow the problem to reoccur) after setting the trap to obtain the dump. 12. See "Searching for a matching problem" on page 78. 13. If you still do not find a matching problem, see Chapter 3, "Reporting RACF problems to IBM" on page 97.
Abends: X'683' X'684' X'685'	<p>Description: Insufficient authority to issue the SVC (supervisor call) instruction. The issuer of the SVC must be APF-authorized (authorized program facility). These abends can occur if a RACF command is not in the TSO command table.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See the message issued with the abend. This could be message IRR401I or ICH409I. Find the abend reason code, if any, in the text for the messages. 2. If you haven't looked up the explanations already, see <i>z/OS Security Server RACF Messages and Codes</i> for the explanations of the message and the abend code. (Abend codes are also called "completion codes.") Pay particular attention to the reason code associated with the abend. In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 3. If the information in <i>z/OS Security Server RACF Messages and Codes</i> is not sufficient to correct the problem, do the rest of the steps in this procedure. 4. Check whether any other error messages were issued with the abend messages. These messages might indicate the context in which the abend occurred. In particular, messages preceding the abend message might indicate conditions that caused the abend. Note: If message IDs were not included with the messages and you can re-create the error, do the following: <ul style="list-style-type: none"> • If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. • If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 5. Find the name of the calling module. This is the module that issued the RACF request (such as a RACF macro, command, or utility). The conditions set up by this module might have caused the abend. See "Identifying the caller of RACF" on page 75.

Table 3. Troubleshooting Table: Abends (continued)

Symptom	Recommended Procedures for Abends
Abends: X'683' X'684' X'685' (continued)	<ol style="list-style-type: none"> 6. Find the owner of the module: an IBM product, a non-IBM product, or a user at your installation. If the module name begins with ICH or IRR, it is a RACF module. Continue with this procedure. If the module name begins with the letters A through I, S, or X (but not ICH or IRR), it is probably part of an IBM product, but it is not RACF. See the diagnosis or logic document for the program of which the module is a part. To determine the name of the component that owns the module, use the component summary in <i>z/OS MVS Diagnosis: Reference</i> . 7. See "Performing a preliminary search for a matching problem" on page 34. If you find a matching problem, apply the appropriate PTFs (program temporary fixes). If you do not find a matching problem, you will need to collect problem information to report to IBM, using the steps in the rest of this procedure. Please be sure to fill out a blank copy of the worksheet shown in Figure 4 on page 98. 8. If the SVC (supervisor call instruction) was issued because a user issued a RACF command, check to be sure the RACF command is in the list of APF-authorized (authorized program facility) commands or in the ISPF command tables. 9. See "Performing a preliminary search for a matching problem" on page 34. If you do not find a matching problem, you will need to collect problem information to report to IBM, using the steps in the rest of this list. 10. If the abend did not generate a system dump, and the problem is reproducible, obtain a system dump. See "Obtaining a system dump" on page 41. 11. Format the system dump. See "Formatting a system dump" on page 42. 12. You might want to re-create the problem you are investigating (or set up the conditions to allow the problem to reoccur) after setting the trap to obtain the dump. 13. See "Searching for a matching problem" on page 78. 14. If you still do not find a matching problem, see Chapter 3, "Reporting RACF problems to IBM" on page 97.
Abends: X'9C7'	<p>Description: RACF token error during RACROUTE functions.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See the message issued with the abend. Find the abend reason code, if any, in the text for the messages. 2. See <i>z/OS Security Server RACF Messages and Codes</i> for information about the abend code and the accompanying message (if you haven't looked up the explanation already). In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 3. If the information in <i>z/OS Security Server RACF Messages and Codes</i> is not sufficient to correct the problem, do the rest of the steps in this procedure. 4. See "Performing a preliminary search for a matching problem" on page 34. If you do not find a matching problem, you will need to collect problem information to report to IBM, using the steps in the rest of this list. 5. If the abend did not generate a system dump, and the problem is reproducible, obtain a system dump. See "Obtaining a system dump" on page 41. 6. Format the system dump. See "Formatting a system dump" on page 42. 7. You might want to re-create the problem you are investigating (or set up the conditions to allow the problem to reoccur) after setting the trap to obtain the dump. 8. See "Searching for a matching problem" on page 78. 9. If you still do not find a matching problem, see Chapter 3, "Reporting RACF problems to IBM" on page 97.

Abends

Table 3. Troubleshooting Table: Abends (continued)

Symptom	Recommended Procedures for Abends
Abends: X'AC5'	<p>Description: Internal RACF problem.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, you will need to collect problem information to report to IBM, using the steps in the rest of this list. 2. Format the system dump. See “Formatting a system dump” on page 42. 3. See “Searching for a matching problem” on page 78. 4. If you still do not find a matching problem, see Chapter 3, “Reporting RACF problems to IBM” on page 97.
Abends: X'D82' X'D83' X'D84' X'D85'	<p>Description: RACF storage manager error during SVC processing.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See the message issued with the abend. This could be message IRR401I or ICH409I. Find the abend reason code, if any, in the text for the messages. 2. If you haven't looked up the explanations already, see <i>z/OS Security Server RACF Messages and Codes</i> for the explanations of the message and the abend code. (Abend codes are also called “completion codes.”) Pay particular attention to the reason code associated with the abend. In general, the information in <i>z/OS Security Server RACF Messages and Codes</i> should be sufficient to correct the problem. 3. If the information in <i>z/OS Security Server RACF Messages and Codes</i> is not sufficient to correct the problem, do the rest of the steps in this procedure. 4. Check whether any other error messages were issued with the abend messages. These messages might indicate the context in which the abend occurred. In particular, messages preceding the abend message might indicate conditions that caused the abend. Note: If message IDs were not included with the messages and you can re-create the error, do the following: <ul style="list-style-type: none"> • If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. • If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 5. Find the name of the calling module. This is the module that issued the RACF request (such as a RACF macro, command, or utility). The conditions set up by this module might have caused the abend. See “Identifying the caller of RACF” on page 75.

Table 3. Troubleshooting Table: Abends (continued)

Symptom	Recommended Procedures for Abends
Abends: X'D82' X'D83' X'D84' X'D85' (continued)	<p>6. Find the owner of the module: an IBM product, a non-IBM product, or a user at your installation.</p> <p>If the module name begins with ICH or IRR, it is a RACF module. Continue with this procedure.</p> <p>If the module name begins with the letters A through I, S, or X (but not ICH or IRR), it is probably part of an IBM product, but it is not RACF. See the diagnosis or logic document for the program of which the module is a part. To determine the name of the component that owns the module, use the component summary in <i>z/OS MVS Diagnosis: Reference</i>.</p> <p>7. See “Performing a preliminary search for a matching problem” on page 34.</p> <p>If you find a matching problem, apply the appropriate PTFs (program temporary fixes). If you do not find a matching problem, you will need to collect problem information to report to IBM, using the steps in the rest of this procedure. Please be sure to fill out a blank copy of the worksheet shown in Figure 4 on page 98.</p> <p>8. If the abend did not generate a system dump, and the problem is reproducible, obtain a system dump. See “Obtaining a system dump” on page 41.</p> <p>9. Format the system dump. See “Formatting a system dump” on page 42.</p> <p>10. You may want to re-create the problem you are investigating (or set up the conditions to allow the problem to reoccur) after setting the trap to obtain the dump.</p> <p>11. See “Searching for a matching problem” on page 78.</p> <p>12. If you still do not find a matching problem, see Chapter 3, “Reporting RACF problems to IBM” on page 97.</p>
Abends: X'E82' X'E83' X'E84' X'E85'	<p>Description: RACF is not installed.</p> <p>Action: Make sure RACF is properly installed.</p>

Documentation

Table 4. Troubleshooting Table: Documentation

Symptom	Recommended Procedures for Documentation
Error in a publication that documents RACF	<p>Action:</p> <ol style="list-style-type: none"> If you have a problem with RACF documentation, consider using the Readers' Comment form at the back of that document to report the documentation error. You have your choice of mailing in a hardcopy comment sheet (the “Readers' Comments” form) or sending us the comment by FAX or electronic mail (see the “Communicating Your Comments to IBM” page in the back). Report the problem to the IBM support center for the following situations: <ul style="list-style-type: none"> The correction to the documentation is needed to prevent a severe problem. You are not sure if the error is in the documentation or the product. The error is in an online panel. If you plan to report the problem to the IBM support center, see: <ol style="list-style-type: none"> “Performing a preliminary search for a matching problem” on page 34 “Searching for a matching problem” on page 78 Chapter 3, “Reporting RACF problems to IBM” on page 97.

Incorrect output

Incorrect output

This section describes incorrect output from RACF. Generally, incorrect output can be missing records, duplicate records, incorrect values, format errors, or meaningless data.

Incorrect output could also be the improper issuing of an error message, an abend code, a return code from a macro, or a wait-state code. For example, an abend could be issued when no abend is needed, or a message that should be issued is not issued. Another example is message text that includes incorrect information.

Table 5. Troubleshooting Table: Incorrect Output

Symptom	Recommended Procedures for Incorrect Output
Incorrect output: Improper access to a protected resource with no message issued	<p>Action:</p> <ol style="list-style-type: none">1. Check whether any error messages were issued for the user request and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID.2. Check the global access checking table for an entry describing the resource. This step does not apply for z/OS or OS/390 z/OS UNIX System Services .3. Check for an installation exit for RACROUTE REQUEST=AUTH. This step does not apply for z/OS or OS/390 z/OS UNIX System Services .4. Check the kind of RACROUTE request that was made. Compare it with the level of protection of the resource. (Use LISTDSD or RLIST command for the resource; use LISTUSER command for the user.) This step does not apply for z/OS or OS/390 z/OS UNIX System Services .5. If the cause of the problem is not apparent, attempt to duplicate the problem with another user doing the same kind of request. Try another user with similar attributes and group associations. If the problem can be duplicated, then determine which user attributes or group associations cause the problem. This can help you define the problem. If the problem cannot be duplicated with other users, try to duplicate the problem with other resources protected like the original.6. See “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, you need to collect problem information to report to IBM, using the procedures in the remainder of this list.7. Get a printed or online copy of the incorrect output. You need it to analyze the problem or report the problem to IBM.8. See “Searching for a matching problem” on page 78.9. See Chapter 3, “Reporting RACF problems to IBM” on page 97.

Table 5. Troubleshooting Table: Incorrect Output (continued)

Symptom	Recommended Procedures for Incorrect Output
Incorrect output: Messages	<p>Action:</p> <ol style="list-style-type: none"> 1. Make sure you have all the error messages that were issued for the user request, and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 2. Decide which of the following types of messages applies: <ol style="list-style-type: none"> a. Macro error messages (MNOTEs) b. System error messages issued by RACF (messages with prefixes of CST, HCP, ICH, IRR, and RPI) 3. Decide what the nature of the message error is. <ol style="list-style-type: none"> a. Was the message valid but unexpected? See “Messages” on page 29. b. Was the message itself incorrect; for example, did it contain incorrect or unreadable data, or was an error message issued for a non-error situation? 4. If you had incorrect output from a RACF macro, see “Utilities:” on page 3 for a list of common application programming errors for RACF; the results of some of these errors could appear to be incorrect output from RACF. 5. See “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, you need to collect problem information to report to IBM using the procedures in the remainder of this list. 6. Get a printed or online copy of the incorrect output. You need it to analyze the problem or report the problem to IBM. <ol style="list-style-type: none"> a. For macro error messages (MNOTEs): Get a copy of the assembler listing that contained the macro error message. b. For system error messages issued by RACF: Get a copy of the part of the job log or system log that contained the message. (The IBM support center might also need to check messages that preceded the error message in the log.) 7. See “Searching for a matching problem” on page 78. 8. See Chapter 3, “Reporting RACF problems to IBM” on page 97.

Incorrect output

Table 5. Troubleshooting Table: Incorrect Output (continued)

Symptom	Recommended Procedures for Incorrect Output
Incorrect output: Incorrect abends	<p>Action:</p> <ol style="list-style-type: none">1. Check whether any error messages were issued in response to the user request and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID.2. Decide what the nature of the abend error is.<ol style="list-style-type: none">a. Was the abend valid but unexpected? Go to “Abends” on page 9.b. Was the abend not documented? Go to “Documentation” on page 19.c. Was the abend itself incorrect? For example, was the abend issued for a non-error situation?d. If you had incorrect output from a RACF macro, see “Utilities:” on page 3 for a list of common application programming errors for RACF; the results of some of these errors could appear to be incorrect output from RACF.3. See “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, you need to collect problem information to report to IBM, using the procedures in the remainder of this list.4. Get a printed or online copy of the incorrect output. You need it to analyze the problem or report the problem to IBM.<p>To Get the Dump Output and Analysis Results:</p><p>Use the procedures described in the following sections:</p><ol style="list-style-type: none">a. “Obtaining a system dump” on page 41, if you need to request a dumpb. “Formatting a system dump” on page 42c. “Validating input” on page 75.5. See “Searching for a matching problem” on page 78.6. See Chapter 3, “Reporting RACF problems to IBM” on page 97.

Table 5. Troubleshooting Table: Incorrect Output (continued)

Symptom	Recommended Procedures for Incorrect Output
<p>Incorrect output: Improperly formatted output from RACF LIST commands (LISTDSD, LISTGRP, LISTUSER, RLIST, and RACLINK LIST)</p>	<p>Action:</p> <ol style="list-style-type: none"> 1. Check whether any error messages were issued for the user request and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 2. Decide what caused the incorrect output: <ul style="list-style-type: none"> • The data read by the command (the RACF database). If this is the case, see the table entry for the RACF database. • RACF's processing of the command request 3. If the database should have been updated by a command that was issued on another system in the RACF remote sharing facility (RRSF) network, check the status of the connection with a TARGET LIST on this system and the originating system. Also, check the RRSFDATA profiles on the originating system. 4. See "Performing a preliminary search for a matching problem" on page 34. If you do not find a matching problem, you need to collect problem information to report to IBM, using the procedures in the remainder of this list. 5. Get a printed or online copy of the incorrect output. You need it to analyze the problem or report the problem to IBM. You can capture the output by executing the command in a batch job, or under the session manager, or in a CLIST in which you trap the output from the command. 6. See "Searching for a matching problem" on page 78. 7. See Chapter 3, "Reporting RACF problems to IBM" on page 97.
<p>Incorrect output: Improperly formatted reports (from DSMON or RACF report writer)</p>	<p>Action:</p> <ol style="list-style-type: none"> 1. Check whether any error messages were issued for the user request and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 2. See "Performing a preliminary search for a matching problem" on page 34. If you do not find a matching problem, you need to collect problem information to report to IBM, using the procedures in the remainder of this list. 3. Get a printed or online copy of the improperly formatted report. You need it to analyze the problem or report the problem to IBM. 4. Check whether the problem is caused by RACF in generating the report or by bad data used as input to the report: As a check on the RACF report writer, you can print (or display) the SMF (system management facility) records using the access method services PRINT command with DUMP specified. As a check on DSMON, use the RACF LIST commands to check the profiles that seem to be reported incorrectly by DSMON. 5. See "Searching for a matching problem" on page 78. 6. See Chapter 3, "Reporting RACF problems to IBM" on page 97.

Incorrect output

Table 5. Troubleshooting Table: Incorrect Output (continued)

Symptom	Recommended Procedures for Incorrect Output
<p>Incorrect output: SMF records (types 80, 81, or 83)</p>	<p>Action:</p> <ol style="list-style-type: none"> 1. Check whether any error messages were issued for the user request and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 2. If the RACF SMF data unload utility leads you to suspect that the SMF (system management facilities) records are not valid, check to make sure that the SMF records are at fault, not the utility. 3. See “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, you need to collect problem information to report to IBM, using the procedures in the remainder of this list. 4. Get a printed or online copy of the incorrect output. You need it to analyze the problem or report the problem to IBM. For SMF records (type 80 or 81): <ul style="list-style-type: none"> • Use the RACF SMF data unload utility to list the contents of the RACF SMF records. See <i>z/OS Security Server RACF Auditor’s Guide</i> for more information. • As a check on the RACF SMF data unload utility, you can print (or display) the record using the access method services PRINT command with HEX specified. • See “Searching for a matching problem” on page 78. • See Chapter 3, “Reporting RACF problems to IBM” on page 97.

Table 5. Troubleshooting Table: Incorrect Output (continued)

Symptom	Recommended Procedures for Incorrect Output
<p>Incorrect output: The RACF database (this includes profiles, index blocks, and inventory control block)</p>	<p>Action:</p> <ol style="list-style-type: none"> 1. Check whether any error messages were issued for the user request and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 2. The following RACF functions affect the RACF database: <ul style="list-style-type: none"> • RACF commands that add, alter, or delete profiles (such as ADDUSER, ALTUSER, DELUSER, RDEFINE, RALTER, and RDELETE) • BLKUPD command • RVARY and SETROPTS commands • IRRUT400 utility • RACF macros: RACDEF, RACINIT, ICHEINTY, ICHECTEST, ICHEACTN, and RACXTRT (with ENCRYPT or TYPE=REPLACE specified) 3. If the database should have been updated by a command that was issued on another system in the RACF remote sharing facility (RRSF) network, check the status of the connection with a TARGET LIST on this system and the originating system. Also, check the RRSFDATA profiles on the originating system. 4. If you had incorrect output from a RACF macro, see “Utilities:” on page 3 for a list of common application programming errors for RACF; the results of some of these errors could appear to be incorrect output from RACF. 5. See “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, you need to collect problem information to report to IBM, using the procedures in the remainder of this list. 6. Get a printed or online copy of the incorrect output. You need it to analyze the problem or report the problem to IBM. Run the IRRUT200 utility and the BLKUPD command to get a description of the RACF database. See <i>z/OS Security Server RACF System Programmer's Guide</i> for a description of how to use IRRUT200, and “Block Update command for a RACF database (BLKUPD)” on page 120 for a description of how to use BLKUPD. 7. See “Searching for a matching problem” on page 78. 8. See Chapter 3, “Reporting RACF problems to IBM” on page 97.

Incorrect output

Table 5. Troubleshooting Table: Incorrect Output (continued)

Symptom	Recommended Procedures for Incorrect Output
Incorrect output: RACF subsystem	<p>Action:</p> <ol style="list-style-type: none"> 1. Check for any messages that might have been issued by the RACF subsystem. 2. Refer to <i>z/OS Security Server RACF Messages and Codes</i>. 3. If the RVPARY command, along with other commands, is not working, then the subsystem is also not working correctly. 4. Check to see if the subsystem initialized correctly; if it did not, check for an install problem and get a system console log (SYSLOG). 5. If a <i>userid.RRSFLIST</i> data set is missing output, or contains incorrect output: <ul style="list-style-type: none"> • Issue the SET LIST command and verify that: <ul style="list-style-type: none"> – Automatic direction or password synchronization is active for the type of request for which output is missing. – The OUTPUT keyword specifies the user ID that should be receiving the missing output. – The correct level of output is specified (ALWAYS, WARN, or FAIL). • Check the RRSFDATA profiles and access lists and make sure that the requests are really being directed. • Check the TSO PREFIX specification for the user ID that is missing the output. If it is set to something other than the user ID, the RRSFLIST data set might have a different name than you expect. • Issue the TARGET LIST command on both nodes involved, and make sure that they are both operative-active, and that requests are not queued in one of the INMSG or OUTMSG data sets. • Check whether anyone stopped the RACF subsystem address space, or used the TARGET command to purge an INMSG or OUTMSG file while a request was active. These actions can cause requests and output to be lost. • Check for TSO TRANSMIT messages to the user ID that is missing the output. If there was an error processing the RRSFLIST data set a message should have been sent. Check the console log too. • Make sure the RRSFLIST data set is allocated with the proper DCB parameters and is not full. If in doubt, you can delete or rename it and let RACF create another one. 6. If an abend occurred, get a copy of the system dump that was taken. 7. If the abend did not generate a system dump, and the problem is reproducible, obtain a system dump. See “Obtaining a system dump” on page 41. 8. Format the system dump. See “Formatting a system dump” on page 42.

Table 5. Troubleshooting Table: Incorrect Output (continued)

Symptom	Recommended Procedures for Incorrect Output
<p>Incorrect output: Return or reason code from a RACF macro or utility</p>	<p>Action:</p> <ol style="list-style-type: none"> 1. Check whether any error messages were issued for the user request and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 2. Decide if the return or reason code is: <ul style="list-style-type: none"> • Incorrect • Undocumented. See “Documentation” on page 19. 3. See “Utilities:” on page 3 for a list of common application programming errors for RACF; the results of some of these errors could appear to be incorrect output from RACF. 4. See “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, you need to collect problem information to report to IBM, using the procedures in the remainder of this list. 5. Get a printed or online copy of the incorrect output. You need it to analyze the problem or report the problem to IBM. Note: If the macro return code or reason code was incorrect, request a system dump from a RACF macro request that produced the incorrect output when RACF returns control. To Get the Dump Output and Analysis Results: Use the procedures described in the following sections: <ol style="list-style-type: none"> a. “Obtaining a system dump” on page 41, if you need to request a dump b. “Formatting a system dump” on page 42 c. “Validating input” on page 75. 6. See “Searching for a matching problem” on page 78. 7. See Chapter 3, “Reporting RACF problems to IBM” on page 97.

Logon problems

Logon problems

Table 6. Troubleshooting Table: Logon Problems

Symptom	Recommended Procedures for Logon Problems
Users cannot log on	<p>Action:</p> <ol style="list-style-type: none"> 1. Check whether any error messages were issued for the user request and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 2. If only one or a few users cannot log on, check that they are using the current password. If no users can log on, do the rest of this procedure. 3. There might be a password synchronization problem, which you should be able to recognize because the user's old password is either accepted as correct or as expired. Enter a RACLINK LIST command on each system to check the user's user ID association if that's what is being used to synchronize passwords. 4. If the database should have been updated by a command that was issued on another system in the RACF remote sharing facility (RRSF) network, check the status of the connection with a TARGET LIST on this system and the originating system. Also, check the RRSFDATA profiles on the originating system. 5. Check the system date in effect for the current system IPL. If the wrong date is in effect, users who cannot log on might have the REVOKE attribute in their user profiles. See <i>z/OS Security Server RACF Security Administrator's Guide</i> for more information on the REVOKE attribute. 6. If you are sharing your database with other systems, make sure that all systems sharing the database are using the same password authentication algorithm, and that there has not been a period of time when the systems were using different algorithms. The default password authentication algorithm for the RACF component of the SecureWay® Security Server is the Data Encryption Standard (DES) algorithm. The default password authentication algorithm for RACF on MVS beginning with RACF 2.1 is the (DES) algorithm, but for releases previous to RACF 2.1 the default is the masking algorithm. Make sure that you have taken the correct steps to activate the algorithm that you intend to use on each system sharing the database. See <i>z/OS Security Server RACF System Programmer's Guide</i> for more information.
Users cannot log on (continued)	<ol style="list-style-type: none"> 7. If you are using a PassTicket, make sure: <ul style="list-style-type: none"> • The PTKTDATA class has been activated and a class profile exists. • You do not try to use the same PassTicket more than once. • The GMT clock on the evaluating computer is within the valid time range. <p>For more information, see <i>z/OS Security Server RACF Security Administrator's Guide</i>.</p> 8. See "Performing a preliminary search for a matching problem" on page 34. If you do not find a matching problem, you need to collect problem information to report to IBM, using the procedures in the remainder of this list. 9. Get a printed or online copy of the SMF records related to the logon problem. You need it to analyze the problem or report the problem to IBM. 10. See "Searching for a matching problem" on page 78. 11. See Chapter 3, "Reporting RACF problems to IBM" on page 97.

Loops

Table 7. Troubleshooting Table: Loops

Symptom	Recommended Procedures for Loops
Any loop during RACF processing	<p>Action:</p> <ol style="list-style-type: none"> 1. Check whether any error messages were issued for the user request that had the loop and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 2. Check whether the prefix of one of the modules involved in the loop is ICH or IRR. Note: The instructions involved in the loop are generally pointed to by the PSW that was active when the system dump was generated. Most modules owned by IBM have an identifier with the module name at either the beginning or end of the object code for the module. See the MVS diagnosis publications if you need further details of general loop analysis techniques. 3. If the prefix is ICH or IRR, the problem might be caused by RACF, and you should use the following diagnostic procedures: <ol style="list-style-type: none"> a. Check that the problem was not due to repeated requests for RACF services. Repeated requests might be caused by a loop of logic in the application program issuing the request. If the loop was in a program making repeated requests, report the problem to the owner of the program. If the loop was within RACF, use the diagnostic procedures in the remainder of this list. b. See “Performing a preliminary search for a matching problem” on page 34. c. If you do not find a matching problem, you need to request a dump (if you don’t have one already) and collect problem information to report to IBM. To Get the Dump Output and Analysis Results: Use the procedures described in the following sections: <ol style="list-style-type: none"> 1) “Obtaining a system dump” on page 41, if you need to request a system dump 2) “Formatting a system dump” on page 42 3) “Validating input” on page 75. d. See “Searching for a matching problem” on page 78 e. See Chapter 3, “Reporting RACF problems to IBM” on page 97. 4. If the prefix of one of the looping modules is neither ICH nor IRR, the problem was probably not caused by RACF. Note the prefixes of the looping modules. If the module is owned by IBM (modules owned by IBM usually start with the letters A through I, S, or X), see the diagnosis or logic document for the program that the module is a part of. To determine the name of the component that owns the module, use the component summary in <i>z/OS MVS Diagnosis: Reference</i>.

Messages

Table 8. Troubleshooting Table: Messages

Symptom	Recommended Procedures for Messages
Messages with a prefix of IKJ	<p>Description: These are TSO messages issued for RACF commands. IKJ messages are issued by the TSO Terminal Monitor Program (TMP).</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See <i>z/OS TSO/E Messages</i> for a description of the message and the condition causing it. Attempt to correct the problem from the information in the messages document. 2. If you cannot correct the problem from the information in the messages document, do the problem determination procedure related to the message.

Messages

Table 8. Troubleshooting Table: Messages (continued)

Symptom	Recommended Procedures for Messages
Messages with a prefix of ICH or IRR	<p>Description: These are RACF messages.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. See <i>z/OS Security Server RACF Messages and Codes</i> for a description of the message and the condition causing it. Attempt to correct the problem from the information in <i>z/OS Security Server RACF Messages and Codes</i>. 2. If you cannot correct the problem from the information in <i>z/OS Security Server RACF Messages and Codes</i>, do the problem determination procedure related to the message.
Messages with a prefix of BPX	<p>Description: These are z/OS and OS/390 z/OS UNIX System Services messages.</p> <p>Action: If there are no RACF messages with this message, the problem is probably not caused by RACF. See your system diagnosis guide for information on correcting this problem.</p>
Unnumbered messages	<p>Description: Unnumbered messages are also issued by RACF.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Make sure that any message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 2. See <i>z/OS Security Server RACF Messages and Codes</i> for a description of the message and the condition causing it. Attempt to correct the problem from the information in the messages document. 3. If the message is not in <i>z/OS Security Server RACF Messages and Codes</i>, and you are certain it is a RACF message, see "Documentation" on page 19.

Performance problems

Table 9. Troubleshooting Table: Performance Problems

Symptom	Recommended Procedures for Performance Problems
<p>Performance, such as:</p> <ul style="list-style-type: none"> • There is excessive I/O to the RACF database. • Users report slow response time, particularly when logging on or off, or when opening data sets. 	<p>Action:</p> <p>Most performance problems related to RACF are corrected by changing the way RACF is set up at an installation.</p> <p>Before suspecting that RACF itself is causing performance problems, review the following checklist to assure that the problem is not actually caused by the way your installation has set up RACF. Pay close attention to any recent changes you have made in the way you have set up RACF. For more information about these performance considerations, see <i>z/OS Security Server RACF System Programmer's Guide</i>.</p> <ul style="list-style-type: none"> • The rate at which users log on to TSO/E, sign on the IMS/VS or CICS/VS, or submit batch jobs on MVS affects system performance. The higher the rate, the lower the performance. You might see peaks and valleys in performance through the work day. • Using the RACLIST or GENLIST operands on the SETROPTS command can improve system performance. • Use of the global access checking table can improve system performance. • Using RACROUTE REQUEST=FASTAUTH instead of RACROUTE REQUEST=AUTH can improve system performance. • Using ADSP and PROTECT=YES can degrade system performance. • The processing performed by installation-written exit routines can affect system performance. • The placement of the RACF database on DASD (including how many DASDs the database is placed on) can affect system performance. • The use of logging by users with SPECIAL or group-SPECIAL attributes or users with AUDITOR or group-AUDITOR attributes can reduce system performance. • The gathering of resource statistics can reduce system performance. • The use of certain RACF commands (such as SEARCH, LISTDSD with the ID or PREFIX operands, LISTGRP *, and others) can reduce system performance when there is a single RACF database. • The use of RACF utilities can reduce system performance when there is a single data set in the RACF database. • The use of erase-on-scratch can reduce system performance.

Performance problems

Table 9. Troubleshooting Table: Performance Problems (continued)

Symptom	Recommended Procedures for Performance Problems
Performance (continued)	<ul style="list-style-type: none"> • During failsoft processing, the operator is prompted frequently, thereby degrading system performance while you repair RACF. To improve system performance during failsoft processing, write a RACROUTE REQUEST=AUTH preprocessing exit. • List of groups processing can reduce system performance. • Group authority processing when made to percolate for a user to subgroups owned by the group can reduce system performance. • Defining many generic profiles within a data set high-level qualifier or a general resource class can hurt performance. • The use of the IRRACEE VLF class can improve system performance. The use of the IRRUMAP, IRRGMAP, and IRRSMAP VLF classes can improve performance of z/OS and OS/390 z/OS UNIX System Services . • See “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, you will need to collect problem information to report to IBM, using the procedures in the remainder of this list. • See “Searching for a matching problem” on page 78. • See Chapter 3, “Reporting RACF problems to IBM” on page 97.

RACF return codes

Table 10. Troubleshooting Table: Return Codes

Symptom	Recommended Procedures for Return Codes
<p>Return codes from RACF macros (nonzero value in register 15)</p>	<p>Action:</p> <ol style="list-style-type: none"> 1. For some macros, depending on the return code, there is a reason code in register 0. Check register 0 for this reason code. (To obtain the reason code from a RACF macro, see “Obtaining RACF return codes and reason codes from a RACF macro invocation” on page 42.) 2. See “Utilities:” on page 3 for a summary of some commonly encountered macro reason codes and advice on how to resolve problems that are due to an error in the program that issued a RACF macro. Note: Error return codes and reason codes from a RACF macro are generally due to a problem in the program that issued the macro. 3. If you haven’t done so already, look up the explanation of the RACF macro’s return and reason codes. See <i>z/OS Security Server RACF Macros and Interfaces</i>, except for the RACROUTE macro, which is described in <i>z/OS Security Server RACROUTE Macro Reference</i>. Note: For the RACROUTE macro, you should also check the first and second words of the SAF parameter list. These are the return and reason codes from the RACF request (usually a RACF macro invocation). 4. Check whether any error messages were issued for the user request, and make sure that message IDs are included with the messages. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options: PROFILE WTPMSG MSGID. 5. The module that issued the macro is either owned by IBM or is a non-IBM product. If the module is owned by IBM (modules owned by IBM usually start with the letters A through I, S, or X), see the diagnosis or logic document for the program of which the module is a part. To determine the name of the component that owns the module, use the component summary in <i>z/OS MVS Diagnosis: Reference</i>. 6. If the problem still appears to be caused by RACF, use the diagnostic procedures described in the following sections: <ol style="list-style-type: none"> a. “Performing a preliminary search for a matching problem” on page 34. If you do not find a matching problem, continue diagnosis, using the procedures in the remainder of this list. b. If you need to request a system dump, “Obtaining a system dump” on page 41. c. “Formatting a system dump” on page 42. d. “Validating input” on page 75. e. “Searching for a matching problem” on page 78. f. Chapter 3, “Reporting RACF problems to IBM” on page 97.
<p>RACF manager return codes</p>	<p>Action:</p> <ol style="list-style-type: none"> 1. See <i>z/OS Security Server RACF Messages and Codes</i> for a description of the message and the condition causing it. Attempt to correct the problem from the information in the messages document. 2. If you cannot correct the problem from the information in the messages document, perform the problem determination procedure that is related to the message.
<p>Return codes from RACF callable services</p>	<p>Action:</p> <ol style="list-style-type: none"> 1. Check the parameter list for the SAF return code, the RACF return code, and the RACF reason code. 2. If you haven’t done so already, look up the explanations of the return codes and reason codes. See <i>z/OS Security Server RACF Callable Services</i> and <i>z/OS Security Server RACF Messages and Codes</i>.

Waits

Waits

Table 11. Troubleshooting Table: Waits

Symptom	Recommended Procedures for Waits
Wait: <ul style="list-style-type: none">• Enabled wait (“hang”) in the task that issued a RACF request• Dummy (no work) wait• Wait caused by RACF	Action: <ol style="list-style-type: none">1. First, see your system diagnosis guide to check which module caused the wait. Try to find out what address space the module was running in. The key question to answer is, “Why was the job or user waiting?” (If a task is waiting for a RACF macro request, RACF might not have caused the wait; another routine could cause the wait if it never released a resource needed by RACF.) Perform the remaining diagnostic steps only if you have determined that RACF is actually the cause of the problem (that is, RACF never released a resource or caused the wait in some other way).2. Check whether any error messages were issued for the user request that immediately preceded the wait. If a batch job produced the output, check that the job statement had MSGLEVEL=(1,1) specified. If a TSO/E user had the problem, check that the user profile had the following options specified: PROFILE WTPMSG MSGID.3. If the prefix of a module that caused the wait is ICH or IRR, the problem is probably caused by RACF and the following diagnostic procedures apply:<ol style="list-style-type: none">a. “Performing a preliminary search for a matching problem”. If you do not find a matching problem, continue diagnosis, using the procedures in the remainder of this list.b. If you do not have a dump, “Obtaining a system dump” on page 41.c. “Formatting a system dump” on page 42.d. “Validating input” on page 75.e. “Searching for a matching problem” on page 78.f. Chapter 3, “Reporting RACF problems to IBM” on page 97.4. If the prefix of the waiting module’s name is neither ICH nor IRR, the problem was probably not caused by RACF. If the module is owned by IBM (modules owned by IBM usually start with the letters A through I, S, or X), see the diagnosis or logic document for the program of which the module is a part. To determine the name of the component that owns the module, use the component summary in <i>z/OS MVS Diagnosis: Reference</i>.

Performing a preliminary search for a matching problem

Introduction to procedure

This topic tells you how to create a list of symptoms for RACF. You (or IBM) can use these symptoms in the search argument for a preliminary search of a problem database.

A search argument consists of a set of problem symptoms, called search symptoms, to use in a search to identify a matching problem.

If you have a search tool such as Information/Management, consider searching the following for a matching problem (which could have a fix already developed). You should search in the order shown:

1. PSP bucket (Preventive Service Plan)
2. Your problem database (if you have one)
3. An IBM problem database

Preliminary search

If you find that the problem has already been reported, you can avoid or reduce time-consuming problem analysis work. In addition, if you have the Info/Access tool, or SoftwareXcel Extended in the ServiceLink application on IBMLink, you can order the fix for the problem.

If you don't have a search tool, you need to collect additional search symptoms before you report the problem to IBM. (The troubleshooting tables list the additional procedures to use.)

If you are doing a structured search, you should provide symptoms in the order that they are listed in DAEDATA and SYMPTOMS output, in order to have the fastest search.

The procedure gives examples of the free-format search symptoms that you can use if you have a search tool such as Info/System (with the Info/MVS database) or Info/Management. It also has examples of the search symptoms that you need if you do a structured search using a tool such as Info/Management or Info/Access. You might need the structured symptoms if you call the IBM support center to report a problem or if you review the APAR and PTF descriptions in IBM's Early Warning System (EWS). EWS is on microfiche and on the Info/MVS database.

The formats used in the examples are the same formats that are used at the IBM support center to enter problem descriptions for APARs and to do searches.

Related information

If you need information about doing problem searches with the Info/System, Info/MVS, Info/Management, or Info/Access program, see *Introducing the Information/Family*.

For examples of Info/Management panels and structured search symptoms to use in a search for a matching problem, see *Using Information/Family Problem Management*.

Procedure

Before you begin: You need to verify that this is a problem caused by RACF and to collect some initial problem symptoms. See "Troubleshooting tables for problems in RACF" on page 7 for steps to perform this prerequisite.

Perform the following steps to:

1. Make an initial list of search symptoms.
 2. Use the list to search for a matching problem.
 3. If you didn't find a match, try other symptoms.
 4. If you found too many matches, add search symptoms.
 1. Use Table 12 on page 36 to select which search arguments apply to the type of problem you have.
-
2. Using Table 13 on page 38 for examples of search arguments, do your first search for a match.
-
3. If your search doesn't produce a match, try widening your search.
 - a. Use the word "RACF" instead of the component ID.
 - b. Use fewer search arguments.
-

Preliminary search

4. If a search produces too many matches, use some of the other symptoms listed in this procedure to narrow the search.
-
5. If your preliminary searches are unsuccessful, do the structured search described in “Searching for a matching problem” on page 78.
 - a. If a structured search is still unsuccessful, gather additional information before reporting the problem to IBM by using the diagnostic procedures recommended for your type of problem.
 - b. Return to where you were in the troubleshooting tables.
-
6. If your search has too many matches, consider using the following procedures to add search symptoms:
 - a. Return to the troubleshooting tables to obtain one or more additional symptoms to narrow your search.
 - b. Obtain additional search symptoms by analyzing a dump or doing other in-depth analysis. (For lists of the procedures for doing the analysis, return to where you were in the troubleshooting tables.)

Note: “Searching for a matching problem” on page 78 summarizes the additional symptoms that you can obtain through in-depth analysis.

You know you are done when you have found a problem match for your symptom or have contacted IBM for additional help.

Table 12. Preliminary Search Symptoms for RACF

Search Argument	Free-Format Example	Structured Example
Component identification (ID) The component ID matches problems that had RACF as either the cause of the problem or the apparent cause (for a problem that was reassigned to another component).	RACF 5752XXH00 5752SC1BN	PIDS/5752XXH00 PIDS/5752SC1BN
Release level of RACF: Use the FMID (function modification identifier). For a list of RACF FMIDs, see Table 14 on page 39.	R902 or RI02 (R for release; I, the ninth letter of the alphabet, can stand for 9; and 02 for 02). R922 (for RACF 1.9.2) R210 (for RACF 2.1) R220 (for RACF 2.2) R230 (for FMID HRF2230) R240 (for FMID HRF2240) R260 (for FMID HRF2260) 2608 (for FMID HRF2608) 7703 (for FMID HRF7703)	LVLS/902 or LVLS/RI02 LVLS/922 LVLS/210 LVLS/220
RACF request that failed	RACHECK PROFILE	PCSS/RACHECK PCSS/PROFILE
Error reason code from the RACF request (if available)	rc00000004	PRCS/00000004

Table 12. Preliminary Search Symptoms for RACF (continued)

Search Argument	Free-Format Example	Structured Example
<p>Associated error message ID</p> <p>The job log or system log might contain error messages associated with the problem that you encountered. Some problems produce multiple error messages, such as problems initiated by a previous abend or I/O error.</p> <p>General error messages, such as the IEA995I symptom dump message for all types of abends, aren't needed as search symptoms.</p>	msglCH408I	MS/ICH408I
Associated reason code from message	rc04	PRCS/04
RACF module	ICHRIN00	RIDS/ICHRIN00
SMF record with error	SMF type 80	RECS/SMF80
Part of a document title	Security Administrator's Guide	PUBS/security PUBS/administrator's PUBS/guide
Symptoms for later searches		
<p>Component ID of a service used by RACF, such as Master Scheduler</p> <p>If you suspect a problem in a system service used by RACF, consider a search argument of the service's component ID, plus the failing RACF request and the problem type (such as an abend and reason code).</p>	5752SC1B8	PIDS/5752SC1B8
<p>A PTF number</p> <p>Consider use of this symptom if a recent PTF (program temporary fix) updated a RACF module involved in the problem. This does not mean that an error exists in the PTF, only that the problem might occur after this PTF is installed.</p>	UY00934 UW02010	PTFS/UY00934 PTFS/UW02010
Area within a document, such as a part, section, chapter, appendix, or page	Chapter3 appendixA	PUBS/CHAP3 PUBS/APPXA

Preliminary search

Table 12. Preliminary Search Symptoms for RACF (continued)

Search Argument	Free-Format Example	Structured Example
Document order number Document order numbers end with a version number, such as the 01 in GC28-1154-01. All version numbers are now two digits, although previously they could be one. You could leave off the second hyphen and the version numbers that follow it. Then, if you receive too many matches, add the version numbers to the search symptom.	GC28-1154-01	PUBS/GC28115401

Examples of search arguments for RACF

Table 13 has examples of free-format search arguments for problems in RACF.

Table 13. Examples of Search Arguments for RACF

Problem Type	Example of Search Argument	Descriptions of Search Symptoms
Abend	5752XXH00 abend685 rc04	Component ID Abend code Abend reason code (if one exists)
Documentation error	5752XXH00 doc RACHECK	Component ID The word <i>doc</i> The name of the RACF request with the documentation error
Incorrect output	5752XXH00 RACHECK output	Component ID The type of output request that was involved The word <i>output</i>
Loop	5752XXH00 ICHRIN00 enabled loop	Component ID The name of any associated module (or RACF request) The word <i>loop</i> . Add the word <i>enabled</i> or <i>disabled</i> if you know the type of loop.
Message	5752XXH00 msgICH408I invalid password	Component ID The message identifier Any inserted code (or text) in the message
Performance degradation	5752XXH00 RACHECK performance	Component ID The name of any associated RACF request The word <i>performance</i>

Table 13. Examples of Search Arguments for RACF (continued)

Problem Type	Example of Search Argument	Descriptions of Search Symptoms
Return code from macro	5752XXH00 RACHECK rc08rc04	Component ID The return code and any reason code (Specify both return code and reason code if a reason code occurred.)
Wait - <i>hang</i> or coded wait state (using ICHRIN00)	5752XXH00 ICHRIN00 enabled wait	Component ID The name of any associated RACF module (or RACF request) The word <i>wait</i> and any associated wait-state code (for a wait state indicated at the system operator's console). If you know the type of wait, add the word <i>enabled</i> , <i>disabled</i> , or <i>dummy</i> (for a no-work wait).
Wait - <i>hang</i> or coded wait state (using RACHECK)	5752XXH00 RACHECK wait03c	Component ID The name of any associated RACF module (or RACF request) The word <i>wait</i> and any associated wait-state code (for a wait state indicated at the system operator's console). If you know the type of wait, add the word <i>enabled</i> , <i>disabled</i> , or <i>dummy</i> (for a no-work wait).

Table 14. RACF FMIDs

RACF Level	RACF FMID
RACF 1.9	HRF1902
RACF 1.9.2	JRF1922
RACF 2.1	HRF2210
RACF 2.2	HRF2220
OS/390 Release 1	HRF2220
OS/390 Release 2	HRF2220
OS/390 Release 3	HRF2230
OS/390 Version 2 Release 4	HRF2240
OS/390 Version 2 Release 5	HRF2240
OS/390 Version 2 Release 6	HRF2260
OS/390 Version 2 Release 7	HRF2260
OS/390 Version 2 Release 8	HRF2608
OS/390 Version 2 Release 9	HRF2608
OS/390 Version 3 Release 10	HRF7703

Preliminary search

Chapter 2. Collecting and analyzing problem data

This chapter explains how to collect and analyze problem data. These tasks include obtaining dumps and traces, validating input, and searching for matching problems.

Collecting problem data

If you don't know what data to collect for the problem that you are diagnosing, see "Troubleshooting the problem" on page 1. Also, Chapter 3, "Reporting RACF problems to IBM" on page 97 summarizes the information that you should consider collecting before reporting each type of problem to IBM.

Obtaining a description of a RACF installation

For advice on gathering information about a RACF installation, see the section on conducting an audit in *z/OS Security Server RACF Auditor's Guide*.

Obtaining a system dump

Prerequisites

You have a problem with an abend for which a system dump was not taken.

Introduction to procedure

If the problem occurred while a batch job was using the DSMON command (or the RACF report writer), run the job again with a SYSABEND DD statement specified. This generates a system dump.

If an abend does not produce a system dump, and the problem is reproducible, set a SLIP trap to obtain a system dump the next time the problem recurs.

The trap set by this procedure causes an SVC dump to be generated. Generally, an SVC dump contains all the information needed for debugging RACF-related problems. You may want to re-create the problem you are investigating (or set up the conditions to allow the problem to recur) after setting the trap.

Procedure

1. On the operator's console, enter the following command:

```
SLIP SET,COMP=xxx,ACTION=SYNCSVCD,JOBNAME=jobname,END
```

where *xxx* is the system completion code and *jobname* is the job name (if a batch job is involved) or the user ID (if an interactive user is involved).

Note: For more information on setting the SLIP trap, see *z/OS MVS System Commands*.

2. When the abend occurs, the system console receives message IEA989I:

```
SLIP TRAP ID=nnn MATCHED
```

where *nnn* is the system-assigned SLIP ID. The operator should notify you if a system dump was requested. You can format and read the system dump.

Note: A system dump is not generated if the SLIP is a NODUMP SLIP.

Collecting data

Formatting a system dump

Prerequisites

- IPCS
- A system dump (see “Obtaining a system dump” on page 41)

Introduction to procedure

To start debugging a system dump, the IBM support center requires the following information to be formatted in the dump.

Procedure

- Use IPCS to format the system dump by using the following:
 - SUMMARY
 - SUMDUMP
 - FORMAT
 - CURRENT
 - TRACE
 - LOGDATA
 - LPAMAP
 - CPUDATA
 - SYMPTOMS

This can help you start researching a problem. The IBM support center may request further information, for which other verbexits would be used for further research on specific problems.

Obtaining RACF return codes and reason codes from a RACF macro invocation

If the program that issued the RACF macro received an error return code from the macro, but did not produce a message containing the return and reason codes, you can use one of the following techniques to obtain the codes:

- Use the RACF SET TRACE command. See “Obtaining trace records using the SET TRACE command” on page 48.
- Place a TSO TEST trap at the instruction after the macro expansion instructions in the program, and check the return and reason codes when the trap matches.

Note: You could use the SLIP command to set a trap, but it affects system performance. If you use SLIP, consider qualifying it with job name or PVTMOD options, and request an SVC dump when the trap is hit.

- Use the SPZAP (“superzap”) service aid to modify the program that issued the RACF macro:
 1. Locate the RACF macro instruction in the assembly listing or the object code for the program.
 2. Use the SPZAP service aid to change the program’s instruction that follows the last instruction of the macro expansion. Change the instruction operation (op) code to an invalid op code, such as X'00'.
 3. Re-create the problem, using JCL with a SYSMDUMP, SYSUDUMP, or SYSABEND DD statement. The invalid op code causes an X'0C1' abend. The SYSMDUMP DD statement is recommended if you plan to report the problem to IBM.

Obtaining RACF return codes and reason codes from a RACF callable service invocation

If the program that invoked the callable service received an error return code from the macro, but did not produce a message containing the return code and reason code, you can use one of the following techniques to obtain the codes:

- Use the RACF SET TRACE command. See “Obtaining trace records using the SET TRACE command” on page 48.
- Place a TSO TEST trap at the instruction after the callable service invocation in the program, and check the return code and reason code when the trap matches.

Note: You could use the SLIP command to set a trap, but it affects system performance. If you use SLIP, consider qualifying it with job name or PVTMOD options, and request an SVC dump when the trap is hit.

- Use the SPZAP (“superzap”) service aid to modify the program that invoked the callable service:
 1. Locate the callable service invocation in the assembly listing or the object code for the program.
 2. Use the SPZAP service aid to change the program’s instruction that follows the callable service invocation. Change the instruction operation (op) code to an invalid op code, such as X'00'.
 3. Re-create the problem, using JCL with a SYSMDUMP, SYSUDUMP, or SYSABEND DD statement. The invalid op code causes an X'0C1' abend. The SYSMDUMP DD statement is recommended if you plan to report the problem to IBM.

At the time of the trap or the 0C1 abend, Register 1 contains the address of the parameter list for the callable service. This parameter list contains the SAF return code and the RACF return code and reason code. See *z/OS Security Server RACF Callable Services* for more information.

Obtaining traces

When access to a resource is allowed (or denied) incorrectly, you can obtain more data about the problem with GTF trace. GTF trace must be activated to obtain trace output just before reproducing the problem.

To obtain a trace when access is incorrectly denied, do the following:

1. To start GTF, enter the following command:

```
START GTF,TRACE=SLIP
```

2. Set the following SLIP trap:

```
SLIP SET,IF,LPAEP=(ICHRFR00,0,0),ACTION=TRACE,JOBNAME=xxx,  
TRDATA=(STD,REGS,1R??,+100),END
```

where xxx is the job name of a batch job or the user ID of an interactive user.

This SLIP trap produces a GTF trace entry each time a RACROUTE macro is invoked (ICHRFR00 is the module called by RACROUTE). The trace entry contains the parameter list passed with the RACROUTE macro request.

3. Use the START GTF command to trace the SVCs related to the RACHECK macro (equivalent to SVC 130) and RACDEF macro (equivalent to SVC 133). There is more than one way to do this. The following is a suggestion only:
 - a. On the master console, enter the START GTF command with TRACE=SVCP specified.

Collecting data

- b. When GTF prompts for trace-event keywords, specify SVC=(130,133).
4. Run the job that has the access problem (or ask the user to attempt to gain access to the resource again) while GTF is on.
5. Stop GTF after the job has ended or after the user has attempted access.
6. Examine the GTF trace output. See *z/OS MVS IPCS Commands* for more information.

Obtaining traces for program control and Program Access to Data Set (PADS) errors

Program control allows an installation to treat load modules (programs) as protected resources. This gives installations the ability to control who can execute which programs.

Load modules are protected by creating a profile for the program in the PROGRAM general resource class. A program protected by such a profile is called a controlled program.

An installation can use a controlled program as a condition for access to a specified data set. That is, some users can access specified data sets at a specified access level only while executing a certain controlled program. This is known as program access to data sets (PADS). PADS is set up by creating a conditional access list for the data set profile protecting the data sets.

In some cases, users trying to implement program control and PADS might receive message IEC1501I, ABEND 913-38, or message ICH408I, INSUFFICIENT ACCESS AUTHORITY, when they feel they have the necessary authority to open the data set through the conditional access list of the data set. In these scenarios, these error messages most commonly occur when a controlled program has loaded an uncontrolled program.

Other error messages will be generated when dealing with program control and PADS in the user's environment. These RACF processing messages can be used to diagnose errors when defining programs to RACF and the HFS. Check the job log and security console for these diagnostic messages, and use the responses in *z/OS Security Server RACF Messages and Codes* to attempt to correct the problem before setting the slip traps.

In a RACF environment, a program and user combination can open a RACF-protected data set through conditional access list authority if all of the other programs in the environment are RACF-protected. RACF turns on a bit in the TCB, known as the "dirty bit" or TCBNCTL, to indicate that a program not protected by RACF has been loaded into the environment. If this bit is on, an uncontrolled program causes a failure. RACF provides an environment service, IRRENS00, to assist in handling program control and PADS. For more information on this service, refer to *z/OS Security Server RACF Macros and Interfaces*.

Thus, in a RACF environment, it is **not** sufficient to only protect the program doing the open of the data set. To correctly implement PADS, you must protect all of the programs loaded in the environment prior to the attempt to open the data set. This is also true for any utilities that are to be executed. If a utility loads another program during execution, this additional program must also be protected to prevent an error condition. To help users determine what programs need to be protected, a TRACE is provided in "Trace examples" on page 45 so that when set correctly, it will print

out the program name, data set name, and volume required to define profiles in the PROGRAM class for these other programs.

Attention

Read all of the information that follows before beginning any of the activities described.

Trace examples

This section provides two examples of traces. The first example writes a GTF trace record for each program loaded into the environment. The second example can determine additional programs that need to be protected.

Trace example 1: The following slip should be used to write a GTF trace record for each program loaded into the environment:

```
SLIP SET,IF,ACTION=TRACE,LPAMOD=(ICHRFR00,xxxxx),J=jobname,
TRDATA=(STD,REGS,zzzzz),ML=100,END
```

xxxxx The offset into ICHRFR00 where ICHRCP00 starts plus the *yyy* value defined in Table 15 for your RMID level of the ICHRCP00 CSECT. Run an AMBLIST of ICHRFR00 to determine the offset of the beginning of ICHRCP00 into ICHRFR00.

zzzzz See Table 15 for the correct TRDATA information based on your RMID level of the ICHRCP00 CSECT. The *yyy* and *zzzzz* values specified for UW21213 should be used for all later RMID levels beginning with RACF 2.2.0, and for the OS/390 Release 3 level of RACF (HRF2230). If you have a later RMID level for RACF 2.1.0, you should use the *yyy* and *zzzzz* values specified for UW16891.

jobname If the program is executed in batch, this is the name of the job that executes the program. If a TSO user executes the job, this is the TSO user ID. In the case of a TSO user ID, you must set the slip prior to the user logging on to the system.

Table 15. RMID Levels, *yyy* and *zzzzz* Values for Example 1

RMID LEVEL	yyy	zzzzz
UW03221	406	9R?+A0?,+7,9R?+A4?,+2B,9R?+A8?,+5
UW08914	406	9R?+A0?,+7,9R?+A4?,+2B,9R?+A8?,+5
UW16891	BC	9R?+A0?,+7,9R?+A4?,+2B,9R?+A8?,+5
HRF2220	5E	9R?+00?,+7,9R?+04?,+2B,9R?+08?,+5
UW21213	60	9R?+00?,+7,9R?+04?,+2B,9R?+08?,+5
HRF2240 to HRF2608	80	9R?+00?,+7,9R?+04?,+2B,9R?+08?,+5
HRF7703	84	9R?+00?,+7,9R?+04?,+2B,9R?+08?,+5
HRF7707	9C	9R?+00?,+7,9R?+04?,+2B,9R?+08?,+5

Because this slip produces GTF records, you need to start GTF ensuring that you use PARM TRACE=SLIP, then use IPCS to format the data with the GTFTRACE IPCS command.

Collecting data

If the preceding steps have been implemented correctly, 'SLIP S+U' entries are generated in the trace records. Under the 'SLIP S+U' heading, locate the 'General Purpose Register Values' line and obtain the value of R15 for each of the 'SLIP S+U' records in the trace output.

R15 can have 5 possible values:

- 0** User or group is authorized to resource.
- 4** Resource is not defined to RACF.
- 8** User or group is not authorized to resource.
- C** Resource is not defined to RACF and library is controlled.
- 10** User or group is authorized to resource and program has NOPADCHK attribute.

If the value in R15 is 4, 8, or C, a profile in the PROGRAM class must be defined to protect the program identified by this trace entry. In addition to defining the profile in the PROGRAM class, the PERMIT command must be issued to put users or groups in the access list for program's profile. To rebuild the in-storage profile list, issue the SETROPTS WHEN(PROGRAM) REFRESH command after making changes to the PROGRAM class. This allows the changes to take effect immediately. For more information on defining profiles in the PROGRAM class and creating entries in a conditional access list, refer to *z/OS Security Server RACF Security Administrator's Guide*.

Note: If the RACF database is being shared with other systems, the SETROPTS REFRESH takes effect only on the system on which it was issued. In this case, the SETROPTS WHEN(PROGRAM) REFRESH must be issued on all the other sharing systems. This allows the PROGRAM class changes to take effect immediately on the other systems as well. An exception occurs when RACF is enabled for sysplex communications.

The information that you need to define the PROGRAM class profile correctly is found in the 'SLIP USR' section of the trace record following the 'SLIP S+U' section discussed earlier in this section. If the zzzzz value was set correctly you will see:

```
0008 PROGRAM
002C DATASET.NAME
0006 VOLUME
```

where:

PROGRAM

Is the actual name of the program being loaded as it is known to RACF.

DATASET.NAME

Is the name of the data set from which the program name was loaded.
There are instances where the library name does not show up in the trace.

VOLUME

Is the volume that the data set above resides on.

Note: As stated in *z/OS Security Server RACF Security Administrator's Guide*, if a TSO user has executed a non-controlled program during the current session, and then attempts to access a PADS data set, the attempt fails. The TSO user can in some cases temporarily regain a controlled environment by invoking the controlled program through the TSOEXEC command. See "Special consideration when REXX is involved" on page 47 for exceptions to

Collecting data

this. When writing a program, you can do the equivalent by invoking the TSO IKJEFTSR service. This technique can prove extremely useful to users who want to have their programs run from the TSO session, but do not want to protect every program that is executed between logon time and execution of the program intended to access the data set.

Also, program AAOEFTB3 might require protection if the MVS/TSO Dynamic Steplib Facility, program number 5798-DZW, is used while attempting to implement program control in the environment created by TSOEXEC. AAOEFTB3 is normally found in SYS1.LINKLIB.

Trace example 2: There are instances in which the SLIP trace specified in “Trace example 1” on page 45 might not catch all the modules that should be protected. The following SLIP should be used in conjunction with the SLIP trace in “Trace examples” on page 45 if you’re still failing with an ABEND 913.

With this trap, it is not necessary to check the value in general register 15. All modules that appear in the trace records need to be protected.

Note: The same module name might appear multiple times in the trace output. Also, you might not see a library name in the trace.

To determine the additional programs that need to be protected use:

```
SLIP SET,IF,ACTION=TRACE,LPAMOD=(ICHRFR00,xxxxx),J=jobname,
TRDATA=(STD,REGS,zzzzz),END
```

Table 16. RMID Levels, yyy and zzzzz Values for Example 2

RMID LEVEL	yyy	zzzzz
UW03221	8A8	9R?+A0?,+7,9R?+A4?,+2B,9R?+A8?,+5
UW08914	8E4	9R?+A0?,+7,9R?+A4?,+2B,9R?+A8?,+5
UW16891	D2	9R?+A0?,+7,9R?+A4?,+2B,9R?+A8?,+5
HRF2220	76	9R?+00?,+7,9R?+04?,+2B,9R?+08?,+5
UW21213	78	9R?+00?,+7,9R?+04?,+2B,9R?+08?,+5
HRF2240 to HRF2608	98	9R?+00?,+7,9R?+04?,+2B,9R?+08?,+5
HRF7703	9C	9R?+00?,+7,9R?+04?,+2B,9R?+08?,+5
HRF7707	B4	9R?+00?,+7,9R?+04?,+2B,9R?+08?,+5

As with the previous TRACE, you need to run an AMBLIST of ICHRFR00 to determine the offset of ICHRCP00. Also, GTF must be started with TRACE=SLIP.

Special consideration when REXX is involved

As mentioned previously, the TCB contains a bit that indicates if the current environment is trusted to open a program accessed data set (PADS) or not. This bit, the TCBNCTL, is turned on by RACF when an unprotected and “untrusted” program is loaded into the environment.

The TCB dirty bit can also be turned on by TSO/E itself. If this is the case, none of the RACF traces will catch this. If you issue TSOEXEC pgm_name, which called IRXINIT to create a REXX environment, TSO/E would mark the TCBs on the parallel side “dirty”, if the job-step TCB is “dirty”. If there are any stack-related

Collecting data

commands in the REXX exec, TSO/E checks the job-step TCB and marks the parallel side dirty if the job-step dirty bit is on. Examples of stack-related commands are: PUSH, PULL, QUEUE, MAKEBUF.

Even though TSOEXEC creates a “clean” parallel side in a TSOE address space, TSOE can mark the parallel side “dirty” if the REXX exec is being used and depending on what REXX is doing.

Special consideration when using IMS™

DFSDLOC0 is an IMS module that issued an OPEN. This module is not loaded through Contents Supervisor in which case RACF is not called. You cannot use PROGRAM CONTROL/PADS if DFSDLOC0 is involved.

Obtaining traces on z/OS UNIX System Services

When access to a resource is allowed (or denied) incorrectly, you can obtain more data about the problem by using the RACF SET TRACE command, or with GTF trace. GTF trace must be activated to obtain trace output just before reproducing the problem.

To obtain a trace when access is incorrectly denied, using the RACF SET TRACE command. See “Obtaining trace records using the SET TRACE command”.

To obtain a trace with GTF trace, the trace must be activated to obtain trace output just before reproducing the problem. You may use the following procedure:

1. To start GTF, enter the following command:

```
START GTF,TRACE=SLIP
```

2. Set the following SLIP trap for callable services:

```
SLIP SET,IF,LPAEP=(IRRRFR10,0,0),ACTION=TRACE,JOBNAME=xxx,  
TRDATA=(STD,REGS,1R?,+100),END
```

where xxx is the job name of a batch job or the user ID of an interactive user.

This SLIP trap produces a GTF trace entry each time a RACF callable service is invoked (IRRRFR10 is the module called by the RACF callable service). The trace entry contains the parameter list passed with the RACF callable service request.

3. Run the job that has the access problem (or ask the user to attempt to gain access to the resource again) while GTF is on.
4. Stop GTF after the job has ended or after the user has attempted access.
5. Examine the GTF trace output. See *z/OS MVS IPCS Commands* for more information.

Obtaining trace records using the SET TRACE command

The SET TRACE(APPC | NOAPPC | ASID | NOASID | CALLABLE | NOCALLABLE | DATABASE | NODATABASE | IMAGE | NOIMAGE | JOBNAME | NOJOBNAME | CALLABLE | NOCALLABLE | RACROUTE | NORACROUTE) command specifies whether or not Generalized Trace Facility (GTF) records should be created for the specified events. If the TRACE operand is specified, at least one suboperand is required. The record created is EF44 for each trace event. See *z/OS MVS IPCS User's Guide* or *z/OS MVS Diagnosis: Tools and Service Aids* for information on viewing these records.

Note: These records are intended only for diagnosis use when requested by the IBM support center. The format will not be documented.

Attention

Trace records might contain passwords and therefore, trace output data sets should be appropriately protected.

Command tracing

Command tracing can be useful when diagnosing command errors and can be used with any command in *z/OS Security Server RACF Command Language Reference* that supports the AT keyword. It provides a step-by-step history of how the command text is parsed and rebuilt by the RACF command envelope module and can be used to determine which TSO macros are used. It can help determine if the problem is in the command envelope module or the command processor load module and also determine where a failure occurred during command parsing and rebuilding.

To obtain a command trace, do the following:

1. At the operator console, activate SET TRACE(IMAGE).
2. From a TSO terminal in TSO READY mode or from ISPF Option 6 (Command), do one or more of the following:
 - Issue a RACF command and append the two characters `-c` (note there's a leading blank between the command and the two characters) to obtain a trace of the command buffer. This keyword is the most useful and is recommended over the others.
 - Issue a RACF command and append the two characters `-t` (note there's a leading blank between the command and the two characters) to obtain a trace of the TSO macros used during the parsing of the RACF command and to obtain a trace of the command buffer.
 - Issue a RACF command and append the two characters `-n` (note there's a leading blank between the command and the two characters) to not run the command.
3. Output is sent to the user's TSO terminal.

Notes:

1. The three characters that are added to the end of the command must be entered exactly as shown and in lowercase letters only. That is, the command image must be followed by one blank space, either `-c`, `-t`, or `-n` and no trailing blanks.
2. Each of these keywords does one thing, but can be issued on the same command together to get multiple results. For example, `-c -n` would trace, but not run the command.
3. If you front-end commands, ensure that the following information about the command buffer is passed to RACF:
 - The command alias name (for example, AG, ADDGROUP, and so on) is still the first thing in the buffer
 - The `-c`, `-t`, and `-n` are the last characters in the buffer (with no trailing blanks).
4. Do not use the common command exit, IRREVSX01, to put trace characters in the command buffer. Doing this causes a parse error.

See "Front-ending RACF commands" on page 219 for additional information on front-ending RACF commands.

Collecting data

Example of command tracing: Command tracing would be helpful in the following example. You entered the command, `ALTUSER MURPHY DATA('PRESIDENT - CATSKILL DIVISION')`, and the command seemed to run, but the installation data field was not updated. By reissuing the command with the `-c` appended to the end of it, `ALTUSER MURPHY DATA('PRESIDENT - CATSKILL DIVISION') -c`, (note the leading blank between the command and the two characters) you can quickly determine if the RACF command envelope module parsed and rebuilt the command image properly before invoking the ALTUSER command processor module.

The command envelope module does multiple parses and rebuilds of the RACF command. If the traced image has the correct installation data, the problem exists in the command processor or some deeper level of RACF. If the traced image does not have the correct installation data, you isolated the problem to the command envelope module.

Figure 1 shows the command:

```
ALTUSER MURPHY DATA('PRESIDENT - CATSKILL DIVISION') -c
```

being issued, traced, and rebuilt correctly with all the proper keywords. Therefore, the problem must exist in the command processor or some deeper level of RACF.

```
IRRV099I <ALU>
IRRV099I <ALU>
IRRV099I <ALU>
IRRV099I <ALU      (>
IRRV099I <ALU      (MURPHY>
IRRV099I <ALU      (MURPHY)>
IRRV099I <ALU      (MURPHY)>
IRRV099I <ALU      (MURPHY) DATA>
IRRV099I <ALU      (MURPHY) DATA(>
IRRV099I <ALU      (MURPHY) DATA('>
IRRV099I <ALU      (MURPHY) DATA('PRESIDENT - CATSKILL DIVISION>
IRRV099I <ALU      (MURPHY) DATA('PRESIDENT - CATSKILL DIVISION'>
IRRV099I <ALU      (MURPHY) DATA('PRESIDENT - CATSKILL DIVISION'>
IRRV099I <ALU      (MURPHY) DATA('PRESIDENT - CATSKILL DIVISION' )>
IRRV099I <ALU>
IRRV099I <ALU>
IRRV099I <ALU>
IRRV099I <ALU      (>
IRRV099I <ALU      (MURPHY>
IRRV099I <ALU      (MURPHY)>
IRRV099I <ALU      (MURPHY)>
IRRV099I <ALU      (MURPHY) DATA>
IRRV099I <ALU      (MURPHY) DATA(>
IRRV099I <ALU      (MURPHY) DATA('>
IRRV099I <ALU      (MURPHY) DATA('PRESIDENT - CATSKILL DIVISION>
IRRV099I <ALU      (MURPHY) DATA('PRESIDENT - CATSKILL DIVISION'>
IRRV099I <ALU      (MURPHY) DATA('PRESIDENT - CATSKILL DIVISION'>
IRRV099I <ALU      (MURPHY) DATA('PRESIDENT - CATSKILL DIVISION' )>
```

Figure 1. Trace Output Showing a Problem in the Command Processor or RACF

Tracing the R_admin callable service

RACF provides a component trace ability for the R_admin callable service. To activate this trace, start GTF specifying `TRACE=USR`, and issue the RACF `SET TRACE(IMAGE)` command. When tracing of IMAGE events is active, the R_admin callable service records a snapshot of the input data it receives in GTF records, including:

- The function-specific parameter list containing segment and field data

- The caller's jobname, ASID, PSW, and ASCB address

It also logs, in a separate record:

- The return code
- The reason code
- The output messages

Tracing the Callable Services, RACROUTE, and RACF Database Manager Request calls

RACF provides a trace facility that will allow tracing Racroutes, Callable Services, and RACF Database Manager Requests. When tracing these services, the trace routine will copy the parameter lists into a GTF record before and after the function executes. IPCS is used to view the trace data. To obtain these traces:

1. Start the GTF using the GTFRACF Figure 2 on page 52 or other procedure:

```
START GTFRACF.GTF,,,NOPROMPT
```
2. Use the SET command to enable your trace:

```
@SET TRACE(RACROUTE(TYPE(5)) JOBNAME(IBMUSER))
```
3. Reproduce the scenario that you desire. For example start batch job, login, start application, use CICS application or access resource.
4. Next stop GTF to prevent excessive traces:

```
STOP GTF
```
5. Use IPCS to view the trace data. The input trace data is contained in the dataset specified on the IEFORDER DD card in the GTFRACF (or other) procedure. The sample GTFRACF procedure specifies 'SYS1.TRACE'. Once the TSO IPCS session is active the IPCS subcommand 'IP GTF USR' may be used to display the formatted trace.

Note: The SET TRACE command sets data in the IRRSAFT control block, see Appendix B, "The Security Product Trace Area (SAFT)" on page 239. This information can be used by IBM support to help diagnosis SAF TRACE problems.

Performance Considerations:

- Security as implemented on the OS/390, z/OS platform includes many calls to the security product. This trace facility can adversely affect system performance by adding to the path length associated with performance sensitive security functions. This trace should only be used as a debugging aid. Caution should be exercised when designing the trace (as with any other trace) so as to impose the least performance penalty. For example, if the address space ID or jobname is known, use these to restrict the scope of the trace.

Usage hints:

- RACF database contention
 - The scope of RACF database serialization is dependent on the RACF database manager parameter list. Set up a trace for Manager ALTER requests on the specific ASID indicated via GRS contention displays. Examine the trace records to find out what RACF is changing in the database so frequently.
 - When applications specify subsystem and requestor information, this will be contained in the trace record header. You can determine who is issuing the security function.

Collecting data

```
//GTFRACF PROC MEMBER=GTFPRM#0
//BR14 EXEC PGM=IEFBR14,REGION=512K
//SYSPRINT DD SYSOUT=*
//D DD DISP=(OLD,DELETE),UNIT=3380,VOL=SER=TEMP01,
// DSN=SYS1.TRACE
//IEFPROC EXEC PGM=AHLGTF,PARM='MODE=EXT,DEBUG=NO,SA=100K,AB=100K',
// REGION=2880K,TIME=NOLIMIT
//IEFRDR DD DSN=SYS1.TRACE,UNIT=3380,VOL=SER=TEMP01,
// DISP=(NEW,CATLG),SPACE=(TRK,(100))
//SYSLIB DD DSN=RACFDRVR.PARMLIB.R6(&MEMBER),DISP=SHR
```

Figure 2. Sample Proc 1: GTFRACF

```
TRACE=USRP
USR=(F44),END
```

Figure 3. Sample Parmlib Member: GTFPRM#0

Reading a trace output: The trace output formatted by IPCS is split into 3 main sections. The first section contains common information for all services. For example, the caller's information and return codes. The parameter lists and unloaded parameters are found in the second section. The third section is a complete hex dump of the entire GTF record which includes the header information, parameter lists and all of the parameters that were unloaded.

For RACROUTE requests' there are two parameter lists. The first one is the SAF parameter list mapped by ICHSAFP. The second parameter list is mapped by the specific RACROUTE type parameter list. These are described in z/OS Security Server RACF Data Areas. For Callable Services, the parameter lists can be found in z/OS Security Server RACF Callable Services. For Manager calls, see the Diagnosis Guide for the Manager parameter list mapping.

Following the parameter lists are the parameters that are unloaded. Not all parameters are unloaded. Before most parameters are unloaded, there are extra entries that say OFFSET##. This is for informational purposes to let you know that the following parameter is at offset ## in the parameter list. This helps determine what parameter you are examining.

Due to nesting of some services PRE and POST trace records might not be in sequential order. For example, one might see two PRE calls and then two POST calls.

Explaining trace header information:

Trace identifier

SAFTRACE Record type 54.

Record eyecatcher

Eyecatcher for the SAFTRACE record type: RTRACE.

Trace type

Identifies what trace this is. Types are OMVS for callable services, MNGR for manager calls, or RACF for RACROUTE traces. These types are followed by PRE or POST to indicate the record pertains to a pre-function trace or post-function trace.

Ending sequence

This will contain a unique identifier in the case of the trace record exceeded

the maximum size. In case of an abend during the trace, it will contain RECOVERY. Ending sequences indicate a problem occurred during trace capture. If you find these, it is indicative of a problem with the parameter list built by the caller of the function.

Calling address

Address of the caller. This is useful along with a dump of the address space when determining the caller of the service in question. It may not be possible to determine the caller of the function using the Request/Subsystem (when available).

Requestor/Subsystem

Caller's SAFPREQR and SAFPSUBS as specified on RACROUTE.

Primary jobname

Primary jobname.

Primary asid

Primary ASID.

Primary ACEEP

Primary ASID related ACEE pointer, as indicated in ASXBSENV.

Home jobname

Home Jobname.

Home asid

Home ASID.

Home ACEEP

Home ASID related ACEE pointer as indicated in the home address space ASXBSENV field.

Task address

TCB pointer of current task.

Time Time stamp.**Error class**

Possible Security product resource class name in error.

Service number

Service number for Callable service or RACROUTE. (See tables 1 and 2 for supported services).

RACF Return code

RACF Return Code.

RACF Reason code

RACF Reason Code.

Return area address

Address of data returned by the function. When used in conjunction with a dump of an address space, storage creep problems can be isolated to the application.

Parameter count

Number of parameters that were captured. Note, this is not the number of parameters in the parmlist, but rather the number of parameters which were collected.

Collecting data

Tables:

CALLABLE SERVICE	Service / Type Number	CALLABLE SERVICE	Service / Type Number
IRRSIU00	1	IRRSMR00	25
IRRSDU00	2	IRRSPT00	26
IRRSMF00	3	IRRSUG00	27
reserved	4	IRRSFK00	28
IRRSMM00	5	IRRSM100	29
IRRSKA00	6	IRRSK100	30
IRRSKP00	7	IRRSK100	31
IRRSUM00	8	IRRSK200	32
IRRSKM00	9	IRRSK300	33
IRRSKG00	10	IRRSK400	34
IRRSSU00	11	IRRSK500	35
IRRSSE00	12	IRRSK600	36
IRRSSG00	13	IRRSK700	37
IRRSEG00	14	IRRSK800	38
IRRSCE00	15	IRRSK900	39
IRRSCE00	15	IRRSK900*	39
IRRSCE00	16	IRRSK000	40
IRRSCE00	17	IRRSK1000	41
IRRSCE00	18	IRRSK2000	42
IRRSCE00	19	IRRSK3000	43
IRRSCE00	20	IRRSK4000	44
IRRSCE00	21	IRRSK5000	45
IRRSCE00	22	IRRSK6000	46
IRRSCE00	23	IRRSK7000	47
IRRSCE00	24		

*Callable Service IRRSEQ00, R_Admin, has its own trace facility.

RACROUTE CALL=	Service / Type Number
AUTH	1
FASTAUTH	2
LIST	3
DEFINE	4
VERIFY	5
EXTRACT	6
DIRAUTH	7
TOKENMAP	8
VERIFYX	9
TOKENXTR	10
TOKENBLD	11

Collecting data

RACROUTE CALL=	Service / Type Number
EXTRACT, BR=YES	12
AUDIT	13
STAT	14
SIGNON	15
TOKENMAP, XMEM	16
TOKENXTR, XMEM	17

Examples of trace output: When an ACEE is dumped in the trace record, the associated ACEX, USP, and TOKEN are also dumped with it.

Callable Service: Below is an example of SAF trace output for the R_dceauth Callable Service (service type 37) PRE and POST entries.

```
**** GTFTRACE DISPLAY OPTIONS IN EFFECT ****
USR=ALL
```

```
**** GTF DATA COLLECTION OPTIONS IN EFFECT: ****
USRP option
```

```
**** GTF TRACING ENVIRONMENT ****
Release: SP7.0.3  FMID: HBB7706  System name: RACFR13
CPU Model: 4381  Version: FF  Serial no. 111515
```

```
USR57 F44 ASCB 00FA9500          JOBN J23DC002
```

Following is a formatted R_TRACE record.
This trace record was generated by IRRTRC00 with IDENT(R_TRACE).

```
Trace Identifier:      00000036
Record Eyecatcher:    RTRACE
Trace Type:           OMVSPRE
Ending Sequence:      .....
Calling address:      00000000  8B000BAE
Requestor/Subsystem:  .....
Primary jobname:      J23DC002
Primary asid:         0000012E
Primary ACEEP:        00000000  006F6700
Home jobname:         J23DC002
Home asid:            0000012E
Home ACEEP:           00000000  006F6700
Task address:         00000000  006F6B00
Task ACEEP:           00000000  00000000
Time:                 B570BA31  042B3327
Error class:          .....
Service number:       00000025
RACF Return code:    00000000
RACF Reason code:    00000000
Return area address:  00000000  00000000
Parameter count:     00000025
```

```
Area length:          00000040
```

```
Area value:
0B001B2C 0B0016EC 0B0016F0 0B0016EC | .....0.... |
0B0016F4 0B0016EC 0B0016F8 0B001700 | ...4.....8... |
0B0016EC 0B0019A1 0B0019C5 0B0019E9 | .....~...E...Z |
0B0019F2 0B001AE8 0B001704 0B001706 | ...2...Y..... |
```

Collecting data

```
Area length:          00000008
Area value:
D6C6C6E2 C5E30004      | OFFSET..      |
Area length:          00000004
Area value:
00000000                | ....         |
Area length:          00000008
Area value:
D6C6C6E2 C5E30008      | OFFSET..      |
Area length:          00000004
Area value:
00000000                | ....         |
Area length:          00000008
Area value:
D6C6C6E2 C5E3000C      | OFFSET..      |
Area length:          00000004
Area value:
00000000                | ....         |
Area length:          00000008
Area value:
D6C6C6E2 C5E30010      | OFFSET..      |
Area length:          00000004
Area value:
00000000                | ....         |
Area length:          00000008
Area value:
D6C6C6E2 C5E30014      | OFFSET..      |
Area length:          00000004
Area value:
00000000                | ....         |
Area length:          00000008
Area value:
D6C6C6E2 C5E30018      | OFFSET..      |
Area length:          00000004
Area value:
00000000                | ....         |
Area length:          00000008
Area value:
D6C6C6E2 C5E3001C      | OFFSET..      |
Area length:          00000004
```

Area value:
7FFF5268 | "... |

Area length: 000000A8

Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 05C8D6D5 C4C14040 4004E2E8 |HONDA .SY |
E2F14040 40400101 0001054F 40404040 | S1 |
40404040 00000000 00000000 00000000 | |
40404040 40404040 00000000 00000000 | |
00000000 00000000 40404040 40404040 | |
00000000 7FFD3258 00000000 0101054F | |
00000000 00A00000 00000000 00000000 | |
00000000 00000000 7FFD3290 00000000 | |
00000000 7FFD3968 | |

Area length: 00000050

Area value:
50010000 0000C000 00000000 00000000 | &.....{..... |
00000000 00000000 00000000 00000000 | |
00000000 00000000 00000000 00000000 | |
00000000 00000000 00000000 00000000 | |
C8D6D5C4 C1404040 E2E8E2F1 40404040 | HONDA SYS1 |

Area length: 00000090

Area value:
C1C3C5E7 03000000 00000000 00000000 | ACEX..... |
00000000 00000000 00000000 00000000 | |
00000000 00000024 7FFD3000 00000000 | |
00000000 00000000 00000000 00000000 | |
00000000 00000000 00000000 00000000 | |
00000000 00000000 00000000 00000000 | |
00000000 00000000 00000000 00000000 | |
00000000 00000000 00000000 00000000 | |
00000000 00000000 00000000 00000000 | |

Area length: 00000008

Area value:
D6C6C6E2 C5E30020 | OFFSET.. |

Area length: 00000004

Area value:
00000000 | |

Area length: 00000008

Area value:
D6C6C6E2 C5E30024 | OFFSET.. |

Area length: 00000024

Area value:
81828384 85868182 60838485 86608182 | abcdefab-cdef-ab |
838460F1 F1818160 F4F5F4F5 F4F5F4F5 | cd-11aa-45454545 |
F4F5F4F5 | 4545 |

Area length: 00000008

Area value:
D6C6C6E2 C5E30028 | OFFSET.. |

Collecting data

```

Area length:                00000024

Area value:
81828384 85868182 60838485 8660F2F3 | abcdefab-cdef-23 |
F3F260F1 F1818160 F4F5F4F5 F4F5F4F5 | 32-11aa-45454545 |
F4F5F4F5                               | 4545                |

Area length:                00000008

Area value:
D6C6C6E2 C5E3002C                               | OFFSET..           |

Area length:                00000006

Area value:
05C8D6D5 C4C1                               | .HONDA             |

Area length:                00000008

Area value:
D6C6C6E2 C5E30030                               | OFFSET..           |

Area length:                00000008

Area value:
C6C1C3C9 D3C9E3E8                               | FACILITY           |

Area length:                00000008

Area value:
D6C6C6E2 C5E30034                               | OFFSET..           |

Area length:                00000006

Area value:
D7D9D6E3 E6D6                               | PROTWO             |

Area length:                00000008

Area value:
D6C6C6E2 C5E30038                               | OFFSET..           |

Area length:                00000002

Area value:
0006                               | ..                 |

Area length:                00000008

Area value:
D6C6C6E2 C5E3003C                               | OFFSET..           |

Area length:                00000001

Area value:
04                               | .                  |

Area length:                000000A8

Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 07C9C2D4 E4E2C5D9 4004E2E8 | .....IBMUSER .SY |
E2F14040 4040A110 0001054F 40404040 | S1 ~....| |
40404040 00000000 00000000 00000000 | ..... |
40404040 40404040 00000000 00000000 | ..... |
00000000 00000000 40404040 40404040 | ..... |
00000000 006F67A8 00000000 00000000 | .....?.y..... |

```

Collecting data

```
00000000 006F67C0 00000000 0101054F | .....?.{.....|
00000000 00200000 00000000 00000000 | .....|
00000000 006F6888 | .....?.h |
```

Area length: 00000050

Area value:

```
50010207 0003C000 00000000 00000000 | &.....{.....|
D7D6D2E5 D4D4C3D3 C9C2D4E4 E2C5D940 | POKVMMCLIBMUSER
D7D6D2E5 D4D4C3D3 E2E8E2F1 40404040 | POKVMMCLSYS1
C9D5E3D9 C4D94040 00000000 00000000 | INTRDR .....|
C9C2D4E4 E2C5D940 E2E8E2F1 40404040 | IBMUSER SYS1 |
```

Area length: 00000090

Area value:

```
C1C3C5E7 03000000 00FAB6F8 00000000 | ACEX.....8....|
00000000 00000000 00000000 00000000 | .....|
00000000 00000024 006F68D8 00000000 | .....?.Q....|
00000000 00000000 00000000 00000000 | .....|
00000000 00000000 00000000 00000000 | .....|
00000000 00000000 00000000 00000000 | .....|
00000000 00000000 00000000 00000000 | .....|
00000000 00000000 00000000 00000000 | .....|
00000000 00000000 00000000 00000000 | .....|
00000000 00000000 00000000 00000000 | .....|
```

Hexadecimal dump of record follows:

```
+0000 00000036 D9E3D9C1 C3C54040 D6D4E5E2 | ....RTRACE OMVS
+0010 D7D9C540 00000000 00000000 00000000 | PRE .....|
+0020 00000000 00000000 00000000 8B000BAE | .....|
+0030 00000000 00000000 00000000 00000000 | .....|
+0040 00000000 00000000 006F6B00 00FA9500 | .....?.,...n.
+0050 00FA9500 0000012E 0000012E D1F2F3C4 | ..n.....J23D
+0060 C3F0F0F2 D1F2F3C4 C3F0F0F2 006F6700 | C002J23DC002.?..
+0070 006F6700 00000000 B570BA31 042B3327 | .?.|
+0080 00000000 00000000 00000025 00000025 | .....|
+0090 00000040 0B001B2C 0B0016EC 0B0016F0 | ... ..0
+00A0 0B0016EC 0B0016F4 0B0016EC 0B0016F8 | .....4.....8
+00B0 0B001700 0B0016EC 0B0019A1 0B0019C5 | .....~...E
+00C0 0B0019E9 0B0019F2 0B001AE8 0B001704 | ...Z...2...Y....
+00D0 0B001706 00000008 D6C6C6E2 C5E30004 | .....OFFSET..
+00E0 00000004 00000000 00000008 D6C6C6E2 | .....OFFS
+00F0 C5E30008 00000004 00000000 00000008 | ET.....|
+0100 D6C6C6E2 C5E3000C 00000004 00000000 | OFFSET.....|
+0110 00000008 D6C6C6E2 C5E30010 00000004 | ...OFFSET.....
+0120 00000000 00000008 D6C6C6E2 C5E30014 | .....OFFSET..
+0130 00000004 00000000 00000008 D6C6C6E2 | .....OFFS
+0140 C5E30018 00000004 00000000 00000008 | ET.....|
+0150 D6C6C6E2 C5E3001C 00000004 7FFF5268 | OFFSET....."....
+0160 000000A8 C1C3C5C5 FF0000A8 02000000 | ...yACEE...y....
+0170 00000000 00000000 05C8D6D5 C4C14040 | .....HONDA
+0180 4004E2E8 E2F14040 40400101 0001054F | .SYS1 .....|
+0190 40404040 40404040 00000000 00000000 | .....|
+01A0 00000000 40404040 40404040 00000000 | .....|
+01B0 00000000 00000000 00000000 40404040 | .....|
+01C0 40404040 00000000 7FFF5000 00000000 | .....".&.....
+01D0 00000000 00000000 7FFD3258 00000000 | .....".|
+01E0 0101054F 00000000 00A00000 00000000 | ...|.
+01F0 00000000 00000000 00000000 7FFD3290 | .....".|
+0200 00000000 00000000 7FFD3968 00000050 | .....".&.....
+0210 50010000 0000C000 00000000 00000000 | &.....{.....|
+0220 00000000 00000000 00000000 00000000 | .....|
+0230 00000000 00000000 00000000 00000000 | .....|
+0240 00000000 00000000 00000000 00000000 | .....|
+0250 C8D6D5C4 C1404040 E2E8E2F1 40404040 | HONDA SYS1
+0260 00000090 C1C3C5E7 03000000 00000000 | ....ACEX.....|
+0270 00000000 00000000 00000000 00000000 | .....|
```

Collecting data

+0280	00000000	00000000	00000024	7FFD3000"
+0290	00000000	00000000	00000000	00000000	.....
+02A0	00000000	00000000	00000000	00000000	.....
+02B0	00000000	00000000	00000000	00000000	.....
+02C0	00000000	00000000	00000000	00000000	.....
+02D0	00000000	00000000	00000000	00000000	.....
+02E0	00000000	00000000	00000000	00000000	.....
+02F0	00000000	00000008	D6C6C6E2	C5E30020	.....OFFSET..
+0300	00000004	00000000	00000008	D6C6C6E2	.....OFFS
+0310	C5E30024	00000024	81828384	85868182	ET.....abcdefab
+0320	60838485	86608182	838460F1	F1818160	-cdef-abcd-11aa-
+0330	F4F5F4F5	F4F5F4F5	F4F5F4F5	00000008	454545454545...
+0340	D6C6C6E2	C5E30028	00000024	81828384	OFFSET.....abcd
+0350	85868182	60838485	8660F2F3	F3F260F1	efab-cdef-2332-1
+0360	F1818160	F4F5F4F5	F4F5F4F5	F4F5F4F5	1aa-454545454545
+0370	00000008	D6C6C6E2	C5E3002C	00000006	...OFFSET.....
+0380	05C8D6D5	C4C10000	0008D6C6	C6E2C5E3	.HONDA...OFFSET
+0390	00300000	0008C6C1	C3C9D3C9	E3E80000	.....FACILITY..
+03A0	0008D6C6	C6E2C5E3	00340000	0006D7D9	..OFFSET.....PR
+03B0	D6E3E6D6	00000008	D6C6C6E2	C5E30038	OTWO...OFFSET..
+03C0	00000002	00060000	0008D6C6	C6E2C5E3	.....OFFSET
+03D0	003C0000	00010400	0000A8C1	C3C5C5FF	.....yACEE.
+03E0	0000A802	00000000	00000000	00000007	..y.....
+03F0	C9C2D4E4	E2C5D940	04E2E8E2	F1404040	IBMUSER .SYS1
+0400	40A11000	01054F40	40404040	40404000	~....| .
+0410	00000000	00000000	00000040	40404040	.....
+0420	40404000	00000000	00000000	00000000	.....
+0430	00000040	40404040	40404000	00000000	... ..
+0440	6F67A800	00000000	00000000	00000000	?..y.....
+0450	6F67C000	00000001	01054F00	00000000	?..{.....|.....
+0460	20000000	00000000	00000000	00000000	.....
+0470	00000000	6F67F800	00000000	00000000	....?.8.....
+0480	6F688800	00005050	01020700	03C00000	?..h...&&...{..
+0490	00000000	000000D7	D6D2E5D4	D4C3D3C9	.....POKVMCLI
+04A0	C2D4E4E2	C5D940D7	D6D2E5D4	D4C3D3E2	BMUSER POKVMCLS
+04B0	E8E2F140	404040C9	D5E3D9C4	D9404000	YS1 INTRDR .
+04C0	00000000	000000C9	C2D4E4E2	C5D940E2	.....IBMUSER S
+04D0	E8E2F140	40404000	000090C1	C3C5E703	YS1 ....ACEX.
+04E0	00000000	FAB6F800	00000000	00000000	.....8.....
+04F0	00000000	00000000	00000000	00000000	.....
+0500	00002400	6F68D800	00000000	00000000	....?.Q.....
+0510	00000000	00000000	00000000	00000000	.....
+0520	00000000	00000000	00000000	00000000	.....
+0530	00000000	00000000	00000000	00000000	.....
+0540	00000000	00000000	00000000	00000000	.....
+0550	00000000	00000000	00000000	00000000	.....
+0560	00000000	00000000	000000		.....

GMT-02/23/2001 15:50:35.825866 LOC-02/23/2001 11:50:35.825866

USR57 F44 ASCB 00FA9500

JOBN J23DC002

Following is a formatted R_TRACE record.

This trace record was generated by IRRTRC00 with IDENT(R_TRACE).

Trace Identifier:	00000036
Record Eyecatcher:	RTRACE
Trace Type:	OMVSP0ST
Ending Sequence:	.....
Calling address:	00000000 8B000BAE
Requestor/Subsystem:	.....
Primary jobname:	J23DC002
Primary asid:	0000012E
Primary ACEEP:	00000000 006F6700
Home jobname:	J23DC002
Home asid:	0000012E
Home ACEEP:	00000000 006F6700

Collecting data

```

Task address:          00000000 006F6B00
Task ACEEP:           00000000 00000000
Time:                 B570BA31 24A9A94B
Error class:          .....
Service number:       00000025
RACF Return code:    00000000
RACF Reason code:    00000000
Return area address:  00000000 00000000
Parameter count:     00000025

```

```
Area length:          00000040
```

```

Area value:
0B001B2C 0B0016EC 0B0016F0 0B0016EC | .....0.... |
0B0016F4 0B0016EC 0B0016F8 0B001700 | ...4.....8.... |
0B0016EC 0B0019A1 0B0019C5 0B0019E9 | .....~...E...Z |
0B0019F2 0B001AE8 0B001704 0B001706 | ...2...Y..... |

```

```
Area length:          00000008
```

```

Area value:
D6C6C6E2 C5E30004 | OFFSET.. |

```

```
Area length:          00000004
```

```

Area value:
00000000 | .... |

```

```
Area length:          00000008
```

```

Area value:
D6C6C6E2 C5E30008 | OFFSET.. |

```

```
Area length:          00000004
```

```

Area value:
00000000 | .... |

```

```
Area length:          00000008
```

```

Area value:
D6C6C6E2 C5E3000C | OFFSET.. |

```

```
Area length:          00000004
```

```

Area value:
00000000 | .... |

```

```
Area length:          00000008
```

```

Area value:
D6C6C6E2 C5E30010 | OFFSET.. |

```

```
Area length:          00000004
```

```

Area value:
00000000 | .... |

```

```
Area length:          00000008
```

```

Area value:
D6C6C6E2 C5E30014 | OFFSET.. |

```

```
Area length:          00000004
```

```
Area value:
```

Collecting data

```

00000000          | ....          |
Area length:      00000008
Area value:
D6C6C6E2 C5E30018 | OFFSET..     |
Area length:      00000004
Area value:
00000000          | ....          |
Area length:      00000008
Area value:
D6C6C6E2 C5E3001C | OFFSET..     |
Area length:      00000004
Area value:
7FFF5268          | "...         |
Area length:      000000A8
Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 05C8D6D5 C4C14040 4004E2E8 | .....HONDA .SY |
E2F14040 40400101 0001054F 40404040 | S1 ..... |
40404040 00000000 00000000 00000000 | ..... |
40404040 40404040 00000000 00000000 | ..... |
00000000 00000000 40404040 40404040 | ..... |
00000000 7FFF5000 00000000 00000000 | .....&..... |
00000000 7FFD3258 00000000 0101054F | ..... |
00000000 00A00000 00000000 00000000 | ..... |
00000000 00000000 7FFD3290 00000000 | ..... |
00000000 7FFD3968          | ..... |
Area length:      00000050
Area value:
50010000 0000C000 00000000 00000000 | &.....{..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
C8D6D5C4 C1404040 E2E8E2F1 40404040 | HONDA SYS1    |
Area length:      00000090
Area value:
C1C3C5E7 03000000 00000000 00000000 | ACEX..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000024 7FFD3000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
Area length:      00000008
Area value:
D6C6C6E2 C5E30020 | OFFSET..     |
Area length:      00000004
Area value:

```

Collecting data

```

00000000 | .... |
Area length: 00000008
Area value:
D6C6C6E2 C5E30024 | OFFSET.. |
Area length: 00000024
Area value:
81828384 85868182 60838485 86608182 | abcdefab-cdef-ab |
838460F1 F1818160 F4F5F4F5 F4F5F4F5 | cd-11aa-45454545 |
F4F5F4F5 | 4545 |
Area length: 00000008
Area value:
D6C6C6E2 C5E30028 | OFFSET.. |
Area length: 00000024
Area value:
81828384 85868182 60838485 8660F2F3 | abcdefab-cdef-23 |
F3F260F1 F1818160 F4F5F4F5 F4F5F4F5 | 32-11aa-45454545 |
F4F5F4F5 | 4545 |
Area length: 00000008
Area value:
D6C6C6E2 C5E3002C | OFFSET.. |
Area length: 00000006
Area value:
05C8D6D5 C4C1 | .HONDA |
Area length: 00000008
Area value:
D6C6C6E2 C5E30030 | OFFSET.. |
Area length: 00000008
Area value:
C6C1C3C9 D3C9E3E8 | FACILITY |
Area length: 00000008
Area value:
D6C6C6E2 C5E30034 | OFFSET.. |
Area length: 00000006
Area value:
D7D9D6E3 E6D6 | PROTWO |
Area length: 00000008
Area value:
D6C6C6E2 C5E30038 | OFFSET.. |
Area length: 00000002
Area value:
0006 | .. |
Area length: 00000008

```

Collecting data

```
Area value:
D6C6C6E2 C5E3003C | OFFSET.. |
```

```
Area length: 00000001
```

```
Area value:
04 | . |
```

```
Area length: 000000A8
```

```
Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 07C9C2D4 E4E2C5D9 4004E2E8 | .....IBMUSER .SY |
E2F14040 4040A110 0001054F 40404040 | S1 ~.... |
40404040 00000000 00000000 00000000 | ..... |
40404040 40404040 00000000 00000000 | ..... |
00000000 00000000 40404040 40404040 | ..... |
00000000 006F67A8 00000000 00000000 | .....?y..... |
00000000 006F67C0 00000000 0101054F | .....?{..... |
00000000 00200000 00000000 00000000 | ..... |
00000000 00000000 006F67F8 00000000 | .....?.8.... |
00000000 006F6888 | .....?.h |
```

```
Area length: 00000050
```

```
Area value:
50010207 0003C000 00000000 00000000 | &.....{..... |
D7D6D2E5 D4D4C3D3 C9C2D4E4 E2C5D940 | POKVMMCLIBMUSER |
D7D6D2E5 D4D4C3D3 E2E8E2F1 40404040 | POKVMMCLSYS1 |
C9D5E3D9 C4D94040 00000000 00000000 | INTRDR ..... |
C9C2D4E4 E2C5D940 E2E8E2F1 40404040 | IBMUSER SYS1 |
```

```
Area length: 00000090
```

```
Area value:
C1C3C5E7 03000000 00FAB6F8 00000000 | ACEX.....8.... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000024 006F68D8 00000000 | .....?.Q.... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
```

Hexadecimal dump of record follows:

```
+0000 00000036 D9E3D9C1 C3C54040 D6D4E5E2 | ....RTRACE OMVS |
+0010 D7D6E2E3 00000000 00000000 00000000 | POST..... |
+0020 00000000 00000000 00000000 8B000BAE | ..... |
+0030 00000000 00000000 00000000 00000000 | ..... |
+0040 00000000 00000000 006F6B00 00FA9500 | .....?.n. |
+0050 00FA9500 0000012E 0000012E D1F2F3C4 | ..n.....J23D |
+0060 C3F0F0F2 D1F2F3C4 C3F0F0F2 006F6700 | C002J23DC002.?. |
+0070 006F6700 00000000 B570BA31 24A9A94B | .?.....zz. |
+0080 00000000 00000000 00000025 00000025 | ..... |
+0090 00000040 0B001B2C 0B0016EC 0B0016F0 | .. .....0 |
+00A0 0B0016EC 0B0016F4 0B0016EC 0B0016F8 | .....4.....8 |
+00B0 0B001700 0B0016EC 0B0019A1 0B0019C5 | .....~...E |
+00C0 0B0019E9 0B0019F2 0B001AE8 0B001704 | ...Z...2...Y.... |
+00D0 0B001706 00000008 D6C6C6E2 C5E30004 | .....OFFSET.. |
+00E0 00000004 00000000 00000008 D6C6C6E2 | .....OFFS |
+00F0 C5E30008 00000004 00000000 00000008 | ET..... |
+0100 D6C6C6E2 C5E3000C 00000004 00000000 | OFFSET..... |
+0110 00000008 D6C6C6E2 C5E30010 00000004 | ....OFFSET..... |
+0120 00000000 00000008 D6C6C6E2 C5E30014 | .....OFFSET.. |
+0130 00000004 00000000 00000008 D6C6C6E2 | .....OFFS |
```

Collecting data

+0140	C5E30018	00000004	00000000	00000008	ET.....
+0150	D6C6C6E2	C5E3001C	00000004	7FFF5268	OFFSET....."
+0160	000000A8	C1C3C5C5	FF0000A8	02000000	...yACEE...y...
+0170	00000000	00000000	05C8D6D5	C4C14040	.....HONDA
+0180	4004E2E8	E2F14040	40400101	0001054F	.SYS1 .....|
+0190	40404040	40404040	00000000	00000000	.....
+01A0	00000000	40404040	40404040	00000000	.....
+01B0	00000000	00000000	00000000	40404040	.....
+01C0	40404040	00000000	7FFF5000	00000000"&.....
+01D0	00000000	00000000	7FFD3258	00000000"
+01E0	0101054F	00000000	00A00000	00000000	...|.....
+01F0	00000000	00000000	00000000	7FFD3290"
+0200	00000000	00000000	7FFD3968	00000050"&
+0210	50010000	0000C000	00000000	00000000	&.....{.....
+0220	00000000	00000000	00000000	00000000	.....
+0230	00000000	00000000	00000000	00000000	.....
+0240	00000000	00000000	00000000	00000000	.....
+0250	C8D6D5C4	C1404040	E2E8E2F1	40404040	HONDA SYS1
+0260	00000090	C1C3C5E7	03000000	00000000	...ACEX.....
+0270	00000000	00000000	00000000	00000000	.....
+0280	00000000	00000000	00000024	7FFD3000"
+0290	00000000	00000000	00000000	00000000	.....
+02A0	00000000	00000000	00000000	00000000	.....
+02B0	00000000	00000000	00000000	00000000	.....
+02C0	00000000	00000000	00000000	00000000	.....
+02D0	00000000	00000000	00000000	00000000	.....
+02E0	00000000	00000000	00000000	00000000	.....
+02F0	00000000	00000008	D6C6C6E2	C5E30020	.....OFFSET..
+0300	00000004	00000000	00000008	D6C6C6E2	.....OFFS
+0310	C5E30024	00000024	81828384	85868182	ET.....abcdefab
+0320	60838485	86608182	838460F1	F1818160	-cdef-abcd-11aa-
+0330	F4F5F4F5	F4F5F4F5	F4F5F4F5	00000008	454545454545....
+0340	D6C6C6E2	C5E30028	00000024	81828384	OFFSET.....abcd
+0350	85868182	60838485	8660F2F3	F3F260F1	efab-cdef-2332-1
+0360	F1818160	F4F5F4F5	F4F5F4F5	F4F5F4F5	1aa-454545454545
+0370	00000008	D6C6C6E2	C5E3002C	00000006	...OFFSET.....
+0380	05C8D6D5	C4C10000	0008D6C6	C6E2C5E3	.HONDA...OFFSET
+0390	00300000	0008C6C1	C3C9D3C9	E3E80000	.....FACILITY..
+03A0	0008D6C6	C6E2C5E3	00340000	0006D7D9	..OFFSET.....PR
+03B0	D6E3E6D6	00000008	D6C6C6E2	C5E30038	OTWO...OFFSET..
+03C0	00000002	00060000	0008D6C6	C6E2C5E3	.....OFFSET
+03D0	003C0000	00010400	0000A8C1	C3C5C5FF	.....yACEE.
+03E0	0000A802	00000000	00000000	00000007	..y.....
+03F0	C9C2D4E4	E2C5D940	04E2E8E2	F1404040	IBMUSER .SYS1
+0400	40A11000	01054F40	40404040	40404000	~...| .
+0410	00000000	00000000	00000040	40404040	.....
+0420	40404000	00000000	00000000	00000000	.....
+0430	00000040	40404040	40404000	00000000	... ..
+0440	6F67A800	00000000	00000000	00000000	? .y.....
+0450	6F67C000	00000001	01054F00	00000000	? .{.....|.....
+0460	20000000	00000000	00000000	00000000	.....
+0470	00000000	6F67F800	00000000	00000000	....?.8.....
+0480	6F688800	00005050	01020700	03C00000	? .h...&.....{.
+0490	00000000	000000D7	D6D2E5D4	D4C3D3C9	.....POKVMCLI
+04A0	C2D4E4E2	C5D940D7	D6D2E5D4	D4C3D3E2	BMUSER POKVMCLS
+04B0	E8E2F140	404040C9	D5E3D9C4	D9404000	YS1 INTRDR .
+04C0	00000000	000000C9	C2D4E4E2	C5D940E2	.....IBMUSER S
+04D0	E8E2F140	40404000	000090C1	C3C5E703	YS1 ....ACEX.
+04E0	00000000	FAB6F800	00000000	00000000	.....8.....
+04F0	00000000	00000000	00000000	00000000	.....
+0500	00002400	6F68D800	00000000	00000000	....?.Q.....
+0510	00000000	00000000	00000000	00000000	.....
+0520	00000000	00000000	00000000	00000000	.....
+0530	00000000	00000000	00000000	00000000	.....
+0540	00000000	00000000	00000000	00000000	.....

Collecting data

```
+0550 00000000 00000000 00000000 00000000 | ..... |
+0560 00000000 00000000 00000000          | ..... |
                                GMT-02/23/2001 15:50:35.958984 LOC-02/23/2001 11:50:35.958984
```

RACROUTE REQUEST=VERIFY: Below is an example of SAF trace output for RACROUTE REQUEST=VERIFY (service type 5) PRE and POST entries. Note that the column offsets are not exact but the content has not been altered.

```
**** GTFTRACE DISPLAY OPTIONS IN EFFECT ****
USR=ALL
```

```
**** GTF DATA COLLECTION OPTIONS IN EFFECT: ****
USRP option
```

```
**** GTF TRACING ENVIRONMENT ****
Release: SP7.0.3  FMID: HBB7706  System name: RACFR13
CPU Model: 4381  Version: FF  Serial no. 111515
```

```
USR57 F44 ASCB 00FA9B00          JOBN RACF
```

Following is a formatted R_TRACE record.
This trace record was generated by IRRTRC00 with IDENT(R_TRACE).

```
Trace Identifier:      00000036
Record Eyecatcher:    RTRACE
Trace Type:           RACFPRE
Ending Sequence:      .....
Calling address:      00000000  8B04A24E
Requestor/Subsystem:  RSSC06 9  RACF
Primary jobname:      RACF
Primary asid:         0000001D
Primary ACEEP:        00000000  006FFDC0
Home jobname:         RACF
Home asid:           0000001D
Home ACEEP:          00000000  006FFDC0
Task address:         00000000  006EC1A0
Task ACEEP:          00000000  00000000
Time:                 B5773AAD  0E780C4B
Error class:          .....
Service number:       00000005
RACF Return code:     00000000
RACF Reason code:     00000000
Return area address:  00000000  00000001
Parameter count:      0000000A
```

```
Area length:          00000068
```

```
Area value:
00000000 00000000 00680200 00055800 | ..... |
0B089158 0B089160 0B08916C 00000000 | ..j...j-..j%... |
00000000 00000068 00000000 00000000 | ..... |
00400000 00000000 00000000 00000000 | . |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000          | ..... |
```

```
Area length:          0000006C
```

```
Area value:
6C0000A0 00000000 00000000 00000000 | %..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 0B089154 00000000 00000000 | .....j..... |
00000000 00000000 00000000 00000000 | ..... |
```

Collecting data

```
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 | ..... |
```

Area length: 00000008

```
Area value:
D6C6C6E2 C5E30034 | OFFSET.. |
```

Area length: 00000004

```
Area value:
006CF930 | .%9. |
```

Area length: 000000A8

```
Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 085CC2E8 D7C1E2E2 5C015C40 | .....*BYPASS*.* |
40404040 40400000 0001059F 40404040 | ..... |
40404040 00000000 00000000 00000000 | ..... |
40404040 40404040 00000000 00000000 | ..... |
00000000 00000000 40404040 40404040 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 0101059F | ..... |
00000000 00200000 00000000 00000000 | ..... |
00000000 00000000 006CF8A0 00000000 | .....%8..... |
00000000 006CF850 | .....%8& |
```

Area length: 00000050

```
Area value:
50010003 4002C000 00000000 00000000 | &... .{..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
F0F14040 40404040 00000000 00000000 | 01 ..... |
5CC2E8D7 C1E2E25C 40404040 40404040 | *BYPASS* |
```

Area length: 00000090

```
Area value:
C1C3C5E7 03000000 00000000 00000000 | ACEX..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
```

Area length: 000000A8

```
Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 07C9C2D4 E4E2C5D9 4004E2E8 | .....IBMUSER .SY |
E2F14040 4040A110 4001059F D9C1C3C6 | S1 ~. ...RACF |
40404040 00000000 00000000 00000000 | ..... |
40404040 40404040 00000000 00000000 | ..... |
00000000 00000000 40404040 40404040 | ..... |
00000000 006FD0E8 00000000 00000000 | .....?}Y..... |
00000000 006FDFC8 00000000 0101059F | .....?.H..... |
00000000 00200000 00000000 00000000 | ..... |
00000000 00000000 006FFB48 00000000 | .....?..... |
00000000 006FFD70 | .....?.. |
```

Area length: 00000050

Collecting data

```

Area value:
50012204 08004000 00000000 00000000 | &..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
C9C2D4E4 E2C5D940 E2E8E2F1 40404040 | IBMUSER SYS1 |

```

```

Area length:          00000090

```

```

Area value:
C1C3C5E7 03000000 00000000 00000000 | ACEX..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000024 006FE008 00000000 | .....?\. |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |

```

Hexadecimal dump of record follows:

```

+0000 00000036 D9E3D9C1 C3C54040 D9C1C3C6 | ....RTRACE RACF |
+0010 D7D9C540 00000000 00000000 00000000 | PRE ..... |
+0020 00000000 00000000 00000000 8B04A24E | .....s+ |
+0030 D9E2E2C3 F0F640F9 00000000 00000000 | RSSC06 9..... |
+0040 D9C1C3C6 40404040 006EC1A0 00FA9B00 | RACF .>A.... |
+0050 00FA9B00 0000001D 0000001D D9C1C3C6 | .....RACF |
+0060 40404040 D9C1C3C6 40404040 006FFDC0 | RACF .?.{ |
+0070 006FFDC0 00000000 B5773AAD 0E780C4B | .?.{..... |
+0080 00000000 00000001 0000000A 00000005 | ..... |
+0090 00000068 00000000 00000000 00680200 | ..... |
+00A0 00055800 0B089158 0B089160 0B08916C | .....j...j-..j% |
+00B0 00000000 00000000 00000068 00000000 | ..... |
+00C0 00000000 00400000 00000000 00000000 | ..... |
+00D0 00000000 00000000 00000000 00000000 | ..... |
+00E0 00000000 00000000 00000000 00000000 | ..... |
+00F0 00000000 00000000 00000000 0000006C | .....% |
+0100 6C0000A0 00000000 00000000 00000000 | %..... |
+0110 00000000 00000000 00000000 00000000 | ..... |
+0120 00000000 00000000 00000000 00000000 | ..... |
+0130 00000000 0B089154 00000000 00000000 | .....j..... |
+0140 00000000 00000000 00000000 00000000 | ..... |
+0150 00000000 00000000 00000000 00000000 | ..... |
+0160 00000000 00000000 00000000 00000008 | ..... |
+0170 D6C6C6E2 C5E30034 00000004 006CF930 | OFFSET.....%9. |
+0180 000000A8 C1C3C5C5 FF0000A8 02000000 | ...yACEE...y... |
+0190 00000000 00000000 085CC2E8 D7C1E2E2 | .....*BYPASS |
+01A0 5C015C40 40404040 40400000 0001059F | *.* ..... |
+01B0 40404040 40404040 00000000 00000000 | ..... |
+01C0 00000000 40404040 40404040 00000000 | ..... |
+01D0 00000000 00000000 00000000 40404040 | ..... |
+01E0 40404040 00000000 00000000 00000000 | ..... |
+01F0 00000000 00000000 00000000 00000000 | ..... |
+0200 0101059F 00000000 00200000 00000000 | ..... |
+0210 00000000 00000000 00000000 006CF8A0 | .....%8. |
+0220 00000000 00000000 006CF850 00000050 | .....%8&...& |
+0230 50010003 4002C000 00000000 00000000 | &...{..... |
+0240 00000000 00000000 00000000 00000000 | ..... |
+0250 00000000 00000000 00000000 00000000 | ..... |
+0260 F0F14040 40404040 00000000 00000000 | 01 ..... |
+0270 5CC2E8D7 C1E2E25C 40404040 40404040 | *BYPASS* |
+0280 00000090 C1C3C5E7 03000000 00000000 | ....ACEX..... |
+0290 00000000 00000000 00000000 00000000 | ..... |
+02A0 00000000 00000000 00000000 00000000 | ..... |
+02B0 00000000 00000000 00000000 00000000 | ..... |
+02C0 00000000 00000000 00000000 00000000 | ..... |
+02D0 00000000 00000000 00000000 00000000 | ..... |

```

Collecting data

```

+02E0 00000000 00000000 00000000 00000000 .....
+02F0 00000000 00000000 00000000 00000000 .....
+0300 00000000 00000000 00000000 00000000 .....
+0310 00000000 000000A8 C1C3C5C5 FF0000A8 .....yACEE...y
+0320 02000000 00000000 00000000 07C9C2D4 .....IBM
+0330 E4E2C5D9 4004E2E8 E2F14040 4040A110 USER .SYS1 ~.
+0340 4001059F D9C1C3C6 40404040 00000000 ...RACF ....
+0350 00000000 00000000 40404040 40404040 .....
+0360 00000000 00000000 00000000 00000000 .....
+0370 40404040 40404040 00000000 006FD0E8 .....?}Y
+0380 00000000 00000000 00000000 006FDFC8 .....?.H
+0390 00000000 0101059F 00000000 00200000 .....
+03A0 00000000 00000000 00000000 00000000 .....
+03B0 006FFB48 00000000 00000000 006FFD70 .?.....?..
+03C0 00000050 50012204 08004000 00000000 ...&&.....
+03D0 00000000 00000000 00000000 00000000 .....
+03E0 00000000 00000000 00000000 00000000 .....
+03F0 00000000 00000000 00000000 00000000 .....
+0400 00000000 C9C2D4E4 E2C5D940 E2E8E2F1 ....IBMUSER SYS1
+0410 40404040 00000090 C1C3C5E7 03000000 ....ACEX....
+0420 00000000 00000000 00000000 00000000 .....
+0430 00000000 00000000 00000000 00000024 .....
+0440 006FE008 00000000 00000000 00000000 .?\.....
+0450 00000000 00000000 00000000 00000000 .....
+0460 00000000 00000000 00000000 00000000 .....
+0470 00000000 00000000 00000000 00000000 .....
+0480 00000000 00000000 00000000 00000000 .....
+0490 00000000 00000000 00000000 00000000 .....
+04A0 00000000 00000000 .....

```

GMT-02/28/2001 19:57:22.490298 LOC-02/28/2001 15:57:22.490298

USR57 F44 ASCB 00FA9B00 JOBN RACF
 Following is a formatted R_TRACE record.
 This trace record was generated by IRRTRC00 with IDENT(R_TRACE).

```

Trace Identifier:      00000036
Record Eyecatcher:   RTRACE
Trace Type:          RACFPOST
Ending Sequence:     .....
Calling address:     00000000 8B04A24E
Requestor/Subsystem: RSSC06 9 RACF
Primary jobname:     RACF
Primary asid:        0000001D
Primary ACEEP:       00000000 006FFDC0
Home jobname:        RACF
Home asid:           0000001D
Home ACEEP:          00000000 006FFDC0
Task address:        00000000 006EC1A0
Task ACEEP:          00000000 00000000
Time:                B5773AAD 0E8C548B
Error class:         .....
Service number:     00000005
RACF Return code:   00000000
RACF Reason code:   00000000
Return area address: 00000000 0B0891C4
Parameter count:    00000005

```

Area length: 00000068

```

Area value:
00000000 00000000 00680200 00055800 .....
0B089158 0B089160 0B08916C 00000000 ..j...j-..j%....
00000000 00000068 00000000 00000000 .....
00400000 00000000 00000000 00000000 . .....
00000000 00000000 00000000 00000000 .....
00000000 00000000 00000000 00000000 .....

```

Collecting data

```
00000000 00000000 | ..... |
```

```
Area length: 0000006C
```

```
Area value:
```

```
6C0000A0 00000000 00000000 00000000 | %..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 0B089154 00000000 00000000 | .....j..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
```

```
Area length: 000000A8
```

```
Area value:
```

```
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 07C9C2D4 E4E2C5D9 4004E2E8 | ....IBMUSER .SY |
E2F14040 4040A110 4001059F D9C1C3C6 | S1 ~. ...RACF |
40404040 00000000 00000000 00000000 | ..... |
40404040 40404040 00000000 00000000 | ..... |
00000000 00000000 40404040 40404040 | ..... |
00000000 006FD0E8 00000000 00000000 | .....?}Y..... |
00000000 006FD0E8 00000000 0101059F | .....?H..... |
00000000 00200000 00000000 00000000 | ..... |
00000000 00000000 006FFB48 00000000 | .....?..... |
00000000 006FFD70 00000000 00000000 | .....?.. |
```

```
Area length: 00000050
```

```
Area value:
```

```
50012204 08004000 00000000 00000000 | &..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
C9C2D4E4 E2C5D940 E2E8E2F1 40404040 | IBMUSER SYS1 |
```

```
Area length: 00000090
```

```
Area value:
```

```
C1C3C5E7 03000000 00000000 00000000 | ACEX..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000024 006FE008 00000000 | .....?\..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
```

Hexadecimal dump of record follows:

```
+0000 00000036 D9E3D9C1 C3C54040 D9C1C3C6 | ...RTRACE RACF |
+0010 D7D6E2E3 00000000 00000000 00000000 | POST..... |
+0020 00000000 00000000 00000000 8B04A24E | .....s+ |
+0030 D9E2E2C3 F0F640F9 00000000 00000000 | RSSC06 9..... |
+0040 D9C1C3C6 40404040 006EC1A0 00FA9B00 | RACF .>A.... |
+0050 00FA9B00 0000001D 0000001D D9C1C3C6 | .....RACF |
+0060 40404040 D9C1C3C6 40404040 006FFDC0 | RACF .?.{ |
+0070 006FFDC0 00000000 B5773AAD 0E8C548B | .?.{..... |
+0080 00000000 0B0891C4 00000005 00000005 | .....jD..... |
+0090 00000068 00000000 00000000 00680200 | ..... |
+00A0 00055800 0B089158 0B089160 0B08916C | .....j...j-.j% |
+00B0 00000000 00000000 00000068 00000000 | ..... |
+00C0 00000000 00400000 00000000 00000000 | ..... |
+00D0 00000000 00000000 00000000 00000000 | ..... |
+00E0 00000000 00000000 00000000 00000000 | ..... |
+00F0 00000000 00000000 00000000 0000006C | .....% |
```

Collecting data

```

+0100 6C0000A0 00000000 00000000 00000000 |%.
+0110 00000000 00000000 00000000 00000000 |.
+0120 00000000 00000000 00000000 00000000 |.
+0130 00000000 0B089154 00000000 00000000 |.....j.
+0140 00000000 00000000 00000000 00000000 |.
+0150 00000000 00000000 00000000 00000000 |.
+0160 00000000 00000000 00000000 000000A8 |.....y
+0170 C1C3C5C5 FF0000A8 02000000 00000000 |ACEE...y.
+0180 00000000 07C9C2D4 E4E2C5D9 4004E2E8 |....IBMUSER .SY
+0190 E2F14040 4040A110 4001059F D9C1C3C6 |S1 ~. ...RACF
+01A0 40404040 00000000 00000000 00000000 |.
+01B0 40404040 40404040 00000000 00000000 |.
+01C0 00000000 00000000 40404040 40404040 |.
+01D0 00000000 006FD0E8 00000000 00000000 |.....?}Y.
+01E0 00000000 006FD0C8 00000000 0101059F |.....?H.
+01F0 00000000 00200000 00000000 00000000 |.
+0200 00000000 00000000 006FFB48 00000000 |.....?.
+0210 00000000 006FFD70 00000000 50012204 |.....?....&&...
+0220 08004000 00000000 00000000 00000000 |.
+0230 00000000 00000000 00000000 00000000 |.
+0240 00000000 00000000 00000000 00000000 |.
+0250 00000000 00000000 00000000 C9C2D4E4 |.....IBMU
+0260 E2C5D940 E2E8E2F1 40404040 00000090 |SER SYS1 ....
+0270 C1C3C5E7 03000000 00000000 00000000 |ACEX.....
+0280 00000000 00000000 00000000 00000000 |.
+0290 00000000 00000024 006FE008 00000000 |.....?\....
+02A0 00000000 00000000 00000000 00000000 |.
+02B0 00000000 00000000 00000000 00000000 |.
+02C0 00000000 00000000 00000000 00000000 |.
+02D0 00000000 00000000 00000000 00000000 |.
+02E0 00000000 00000000 00000000 00000000 |.
+02F0 00000000 00000000 00000000 00000000 |.

```

GMT-02/28/2001 19:57:22.490583 LOC-02/28/2001 15:57:22.490583

MANAGER ALTER: Below is an example of a MANAGER ALTER trace with PRE and POST entries. Note that the column offsets are not exact but the content has not been altered.

```

**** GTFTRACE DISPLAY OPTIONS IN EFFECT ****
USR=ALL

```

```

**** GTF DATA COLLECTION OPTIONS IN EFFECT: ****
USRP option

```

```

**** GTF TRACING ENVIRONMENT ****
Release: SP7.0.3 FMID: HBB7706 System name: RACFR13
CPU Model: 4381 Version: FF Serial no. 111515

```

```

USR57 F44 ASCB 00FACD00          JOBN IBMUSER

```

Following is a formatted R_TRACE record.
This trace record was generated by IRRTRC00 with IDENT(R_TRACE).

```

Trace Identifier:      00000036
Record Eyecatcher:    RTRACE
Trace Type:           MNGRPRE
Ending Sequence:      .....
Calling address:      00000000 8B000BAE
Requestor/Subsystem:  .....
Primary jobname:      IBMUSER
Primary asid:         00000019
Primary ACEEP:        00000000 006FF608
Home jobname:         IBMUSER
Home asid:            00000019

```

Collecting data

```

Home ACEEP:                00000000 006FF608
Task address:              00000000 006B8220
Task ACEEP:                00000000 00000000
Time:                      B57740CE B8ED7F45
Error class:               .....
Service number:           00000000
RACF Return code:         00000000
RACF Reason code:         00000000
Return area address:       00000000 00000000
Parameter count:          00000006
  
```

```
Area length:                00000050
```

```

Area value:
08004102 0015FFDA 001468F8 00000000 | .....8.... |
00000000 00000000 00000000 01000000 | ..... |
20000000 00000000 40404040 40404040 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
  
```

```
Area length:                00000008
```

```

Area value:
D6C6C6E2 C5E30004 | OFFSET.. |
  
```

```
Area length:                00000004
```

```

Area value:
03D1D1D7 | .JJP |
  
```

```
Area length:                000000A8
```

```

Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 07C9C2D4 E4E2C5D9 4004E2E8 | ....IBMUSER .SY |
E2F14040 4040A110 0001059F 40404040 | S1 ~..... |
40404040 00B28CA0 00000000 00000000 | ..... |
D3D6C3C1 D3C3F1F0 00000000 00000000 | LOCALC10..... |
00000000 00000000 40404040 40404040 | ..... |
00000000 006FDF98 00000000 00000000 | .....?.q..... |
00000000 006FD120 00000000 0101059F | .....?J..... |
00000000 00200000 00000000 00000000 | ..... |
00000000 00000000 006FF578 7F6F5000 | .....?5."?&. |
00000000 006FDFB0 | .....?.. |
  
```

```
Area length:                00000050
```

```

Area value:
50010206 0001C000 00000000 00000000 | &.....{..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
D3D6C3C1 D3C3F1F0 00000000 00000000 | LOCALC10..... |
C9C2D4E4 E2C5D940 E2E8E2F1 40404040 | IBMUSER SYS1 |
  
```

```
Area length:                00000090
```

```

Area value:
C1C3C5E7 03000000 00000000 00000000 | ACEX..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000024 006FF868 00000000 | .....?8..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
  
```

Hexadecimal dump of record follows:

+0000	00000036	D9E3D9C1	C3C54040	D4D5C7D9	....RTRACE MNGR
+0010	D7D9C540	00000000	00000000	00000000	PRE
+0020	00000000	00000000	00000000	00000000	.....
+0030	00000000	00000000	00000000	00000000	.....
+0040	00000000	00000000	006B8220	00FACD00	.....,b.....
+0050	00FACD00	00000019	00000019	C9C2D4E4	.....IBMU
+0060	E2C5D940	C9C2D4E4	E2C5D940	006FF608	SER IBMUSER .?6.
+0070	006FF608	00000000	B57740CE	B8ED7F45	.?6....."
+0080	00000000	00000000	00000006	00000000	.....
+0090	00000050	08004102	0015FFDA	001468F8	...&.....8
+00A0	00000000	00000000	00000000	00000000	.....
+00B0	01000000	20000000	00000000	40404040	.....
+00C0	40404040	00000000	00000000	00000000	.....
+00D0	00000000	00000000	00000000	00000000	.....
+00E0	00000000	00000008	D6C6C6E2	C5E30004	.....OFFSET..
+00F0	00000004	03D1D1D7	000000A8	C1C3C5C5	....JJP...yACEE
+0100	FF0000A8	02000000	00000000	00000000	...y.....
+0110	07C9C2D4	E4E2C5D9	4004E2E8	E2F14040	.IBMUSER .SYS1
+0120	4040A110	0001059F	40404040	40404040	~.....
+0130	00B28CA0	00000000	00000000	D3D6C3C1	.....LOCA
+0140	D3C3F1F0	00000000	00000000	00000000	LC10.....
+0150	00000000	40404040	40404040	00000000	....
+0160	006FDF98	00000000	00000000	00000000	.?.q.....
+0170	006FD120	00000000	0101059F	00000000	.?J.....
+0180	00200000	00000000	00000000	00000000	.....
+0190	00000000	006FF578	7F6F5000	00000000	....?5."?&....
+01A0	006FDFB0	00000050	50010206	0001C000	.?.....&&.....{.
+01B0	00000000	00000000	00000000	00000000	.....
+01C0	00000000	00000000	00000000	00000000	.....
+01D0	00000000	00000000	D3D6C3C1	D3C3F1F0	.....LOCALC10
+01E0	00000000	00000000	C9C2D4E4	E2C5D940	.....IBMUSER
+01F0	E2E8E2F1	40404040	00000090	C1C3C5E7	SYS1 ....ACEX
+0200	03000000	00000000	00000000	00000000	.....
+0210	00000000	00000000	00000000	00000000	.....
+0220	00000024	006FF868	00000000	00000000	....?8.....
+0230	00000000	00000000	00000000	00000000	.....
+0240	00000000	00000000	00000000	00000000	.....
+0250	00000000	00000000	00000000	00000000	.....
+0260	00000000	00000000	00000000	00000000	.....
+0270	00000000	00000000	00000000	00000000	.....
+0280	00000000	00000000	00000000	00000000	.....

GMT-02/28/2001 20:24:48.404209 LOC-02/28/2001 16:24:48.404209

USR57 F44 ASCB 00FACD00

JOBN IBMUSER

Following is a formatted R_TRACE record.

This trace record was generated by IRRTRC00 with IDENT(R_TRACE).

Trace Identifier:	00000036
Record Eyecatcher:	RTRACE
Trace Type:	MNGRPOST
Ending Sequence:	.....
Calling address:	00000000 8B000BAE
Requestor/Subsystem:	.....
Primary jobname:	IBMUSER
Primary asid:	00000019
Primary ACEEP:	00000000 006FF608
Home jobname:	IBMUSER
Home asid:	00000019
Home ACEEP:	00000000 006FF608
Task address:	00000000 006B8220
Task ACEEP:	00000000 00000000
Time:	B57740CE C6AEBD85
Error class:	.....

Collecting data

```

Service number:      00000000
RACF Return code:   00000000
RACF Reason code:   00000000
Return area address: 00000000 00000000
Parameter count:    00000006
  
```

```
Area length:      00000050
```

```

Area value:
08004102 0015FFDA 001468F8 00000000 | .....8.... |
00000000 00000000 00000000 01000000 | ..... |
20000000 00000000 C2C1E2C5 40404040 | .....BASE |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
  
```

```
Area length:      00000008
```

```

Area value:
D6C6C6E2 C5E30004 | OFFSET.. |
  
```

```
Area length:      00000004
```

```

Area value:
03D1D1D7 | .JJP |
  
```

```
Area length:      000000A8
```

```

Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 07C9C2D4 E4E2C5D9 4004E2E8 | .....IBMUSER .SY |
E2F14040 4040A110 0001059F 40404040 | S1 ~..... |
40404040 00B28CA0 00000000 00000000 | ..... |
D3D6C3C1 D3C3F1F0 00000000 00000000 | LOCALC10..... |
00000000 00000000 40404040 40404040 | ..... |
00000000 006FDF98 00000000 00000000 | .....?.q..... |
00000000 006FD120 00000000 0101059F | .....?J..... |
00000000 00200000 00000000 00000000 | ..... |
00000000 00000000 006FF578 7F6F5000 | .....?5."?&. |
00000000 006FDFB0 | .....?.. |
  
```

```
Area length:      00000050
```

```

Area value:
50010206 0001C000 00000000 00000000 | &.....{..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
D3D6C3C1 D3C3F1F0 00000000 00000000 | LOCALC10..... |
C9C2D4E4 E2C5D940 E2E8E2F1 40404040 | IBMUSER SYS1 |
  
```

```
Area length:      00000090
```

```

Area value:
C1C3C5E7 03000000 00000000 00000000 | ACEX..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000024 006FF868 00000000 | .....?8.... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
  
```

```

Hexadecimal dump of record follows:
+0000 00000036 D9E3D9C1 C3C54040 D4D5C7D9 | ....RTRACE MNGR |
+0010 D7D6E2E3 00000000 00000000 00000000 | POST..... |
+0020 00000000 00000000 00000000 00000000 | ..... |
  
```

```

+0030 00000000 00000000 00000000 00000000 .....
+0040 00000000 00000000 006B8220 00FACD00 .....b.....
+0050 00FACD00 00000019 00000019 C9C2D4E4 .....IBMU
+0060 E2C5D940 C9C2D4E4 E2C5D940 006FF608 SER IBMUSER .?6.
+0070 006FF608 00000000 B57740CE C6AEBD85 .?6..... .F..e
+0080 00000000 00000000 00000006 00000000 .....
+0090 00000050 08004102 0015FFDA 001468F8 ...&.....8
+00A0 00000000 00000000 00000000 00000000 .....
+00B0 01000000 20000000 00000000 C2C1E2C5 .....BASE
+00C0 40404040 00000000 00000000 00000000 .....
+00D0 00000000 00000000 00000000 00000000 .....
+00E0 00000000 00000008 D6C6C6E2 C5E30004 .....OFFSET..
+00F0 00000004 03D1D1D7 000000A8 C1C3C5C5 .....JJP...yACEE
+0100 FF0000A8 02000000 00000000 00000000 ...y.....
+0110 07C9C2D4 E4E2C5D9 4004E2E8 E2F14040 .IBMUSER .SYS1
+0120 4040A110 0001059F 40404040 40404040 ~.....
+0130 00B28CA0 00000000 00000000 D3D6C3C1 .....LOCA
+0140 D3C3F1F0 00000000 00000000 00000000 LC10.....
+0150 00000000 40404040 40404040 00000000 ....
+0160 006FDF98 00000000 00000000 00000000 .?.q.....
+0170 006FD120 00000000 0101059F 00000000 .?J.....
+0180 00200000 00000000 00000000 00000000 .....
+0190 00000000 006FF578 7F6F5000 00000000 .....?5."?&.....
+01A0 006FDFB0 00000050 50010206 0001C000 .?.....&&.....{.
+01B0 00000000 00000000 00000000 00000000 .....
+01C0 00000000 00000000 00000000 00000000 .....
+01D0 00000000 00000000 D3D6C3C1 D3C3F1F0 .....LOCALC10
+01E0 00000000 00000000 C9C2D4E4 E2C5D940 .....IBMUSER
+01F0 E2E8E2F1 40404040 00000090 C1C3C5E7 SYS1 ....ACEX
+0200 03000000 00000000 00000000 00000000 .....
+0210 00000000 00000000 00000000 00000000 .....
+0220 00000024 006FF868 00000000 00000000 .....?8.....
+0230 00000000 00000000 00000000 00000000 .....
+0240 00000000 00000000 00000000 00000000 .....
+0250 00000000 00000000 00000000 00000000 .....
+0260 00000000 00000000 00000000 00000000 .....
+0270 00000000 00000000 00000000 00000000 .....
+0280 00000000 00000000 00000000 00000000 .....

```

GMT-02/28/2001 20:24:48.460550 LOC-02/28/2001 16:24:48.460550

Validating input

This section explains how to validate input to RACF processes.

Identifying the caller of RACF

Prerequisites

- “Obtaining a system dump” on page 41
- “Formatting a system dump” on page 42

Introduction to procedure

When a RACF abend occurs, RACF might be the cause of the problem, or the program calling RACF might have passed an incorrect parameter list, which caused RACF to issue the abend. (The parameter list is the only input RACF gets from a caller.)

This section describes how to determine what module issued the RACF macro.

Procedure

1. Look at the system dump and check the TCB with field TCBCMP (equal to the abend code).

Validating input

2. Locate the RB that issued the RACF SVC (SVC 82, 83, 84, or 85). In this RB, get the address of the next sequential instruction from field RBOPSW. If no such RB exists, then the executing RACF service may be PC-entered. In this case, use the “Alternative procedure” on page 76.
3. Find this address in the system dump and scan backward for the eye-catcher (a module or CSECT name printed in readable form along the right margin of the dump). That is the name of the routine that issued the RACROUTE macro.

Note: If the address of the next sequential instruction after the RACROUTE macro is not in the system dump, check an LPA (link pack area) map to determine if it is within an LPA module. If it is within an LPA module, that module is the issuer of the RACROUTE macro.

- If the name you find is not the ICHRF00 module, then the name found caused RACF to abend. (Note that the issuer of the RACF SVC may not have caused the original error but may have merely passed bad data created by yet another module that called it. The end of the bad data chain might be several callers away.)
- If the name you find is the ICHRF00 module, then SAF (the security authorization facility) issued the RACF macro as requested by another module that issued the RACROUTE macro.

To determine who issued the RACROUTE macro, locate the “current task” in the system dump and check the active RBs.

- a. Find the PRB with a RACF SVC (SVC 82, 83, 84, or 85) in the RBRTPSW2 field.
 - b. Find the next RB.
 - In a formatted dump that has been printed, this is the RB below the RB with the SVC.
 - On IPCS (interactive problem control system), this is the RB displayed below the RB with the SVC.
- Check the general-purpose registers in this RB. Register 1 should have the same value as the trace entry for the SVC found in Step 3a. Register 13 points to the save area of the ICHRF00 module.
 - Find the save area of the ICHRF00 module and make sure that in the save area, the address at offset X'4' points to the save area of the ICHSFR00 module (the previous save area).
 - Find the save area of the ICHSFR00 module and make sure that in the save area, the address at offset X'4' points to the save area of the issuer of the RACROUTE macro (the previous save area).
 - Find the save area of the issuer of the RACROUTE macro. In the save area of the issuer of the RACROUTE macro, offset X'C' is the contents of Register 14 of the module that issued the RACROUTE macro. Register 14 contains the address of the instruction after the RACROUTE macro.
 - Find this address in the system dump and scan backward for the eye-catcher (a module or CSECT name printed in readable form along the right margin of the dump). That is the name of the routine that issued the RACROUTE macro.

Alternative procedure

1. Look at the system dump and issue the IPCS command, SUMMARY FORMAT, to format the linkage stack for the failing task or SRB. In most cases, the top entry on this linkage stack represents the current RACF service; this can be

validated by taking the formatted PSW for the stack entry and scrolling backward in memory in search of a module eyecatcher that has a RACF prefix, ICH or IRR.

2. If this stack entry represents a RACF service, then general purpose register 13 should point to a standard save area, and the caller of RACF can be located by tracing backward through a chain of such areas. If these steps do not appear to have produced the caller of RACF, then you cannot determine the caller of RACF without additional support.

Checking the parameter list passed to RACF

Prerequisites

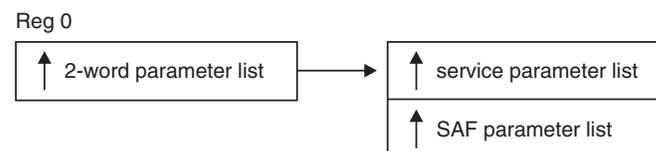
- “Obtaining a system dump” on page 41
- “Formatting a system dump” on page 42.

Introduction to procedure

This procedure is useful only for a RACF macro request that was active when the system dump was generated.

Procedure

1. Find the save area for the routine that issued the RACF macro. This can be found either in the trace-table entry for the SVC associated with the RACF macro, or in the RBs in a formatted dump. See “Identifying the caller of RACF” on page 75.
2. In the save area, find the contents of register 1.
 - If register 1 is zero, then the RACROUTE macro was issued and module ICHFR00 issued the RACF macro. In this case, register zero points to a two-word parameter list. The first word of this parameter list points to the RACF SVC parameter list, and the second word of this parameter list points to the SAF parameter list. This is shown in the following:



- If register 1 is not zero, then this is the address of the parameter list passed with the macro request.
3. Find the address in the storage portion of the system dump. The values in the dump are the actual parameter list as seen by the system when processing the RACF request.
 4. Use the description of the parameter list from “Parameter list descriptions” on page 149 to decode the actual parameter list.

Note: For some parameter lists (such as RACROUTE REQUEST=AUTH, RACROUTE REQUEST=DEFINE, and RACROUTE REQUEST=VERIFY) the length of the parameter list varies from release to release. Check the first byte of these parameter lists for the actual length used.

5. Use the following checks to determine whether the active RACF macro request had an error. You can do the checks most efficiently if you have a listing of the program that issued the macro.
 - a. Did the RACF macro request that invoked RACF services use valid keyword values, including addresses?

Validating input

- b. Did the caller supply a register save area for the RACF macro?
- c. Do the caller's storage areas contain correct values?

You could check the system dump for application program storage areas that appear to have incorrect values, such as missing printable identifiers for modules or control blocks. Key storage areas are pointed to by the register save area for the RACF macro. (Incorrect values are generally caused by logic problems due to incorrect addresses.)

This check is especially important for the following types of unexpected abends, which might involve a logic error in either the application program that issued the RACF macro or a system routine:

- A X'0Cx' abend, such as X'0C4'
- A cancel (a X'x22' abend)

Alternative procedure

After you find the caller of RACF, the first word of the parameter list pointed to from the stack entry should contain the address of the parameters passed to RACF on the request.

Searching for a matching problem

Prerequisites

1. See "Performing a preliminary search for a matching problem" on page 34 for a description of easily located problem symptoms to use to find a matching problem.
2. See "Troubleshooting the problem" on page 1 for the diagnostic procedures to follow to collect additional symptoms needed for a search.

For problems involving system dumps, you need to follow the diagnostic procedures in "Obtaining a system dump" on page 41 and "Formatting a system dump" on page 42

Introduction to procedure

This procedure summarizes search symptoms that you can collect by using this document's problem analysis procedures for RACF. You might want to use these symptoms to search for a matching problem in a problem database, or to report to IBM.

If you need descriptions or examples of entire search arguments, see the prerequisite procedure, "Performing a preliminary search for a matching problem" on page 34.

Procedure

Scan Table 17 on page 79 for additional RACF symptoms that you might want to use in your search for a matching problem (or to report to IBM). It lists some of the most probable search symptoms for problems in RACF.

Note: For abends, additional symptoms such as a register/PSW (program status word) difference and a failing instruction area are automatically produced in DAEDATA output, so they are not repeated here. Notes™ about the symptoms are indicated with asterisks (*) and *Note *n**, where *n* is the number of the note.

Table 17. Additional Search Symptoms for RACF

Description of Search Symptom	Free-Format Example	Structured Example
Control block name	ACEE	FLDS/ACEE
Control block field name 1*	*Note ACEEFLG1	FLDS/ACEEFLG1
Symptoms for later searches		
Level of failing module *Note 2*	HRF2220 or UW09958	LVLS/HRF2220 or PTFS/UW09958

Notes:

1. If you receive too many matches on your first search, consider adding a control block field name or other text from a RACF error message. (Avoid use of addresses or other values that would vary between executions of the RACF function.)
2. The ID and level at the beginning of a failing module might be pointed to by RACF's PSW at the time of the failure. For abends, the module level might be in the SDWAMLVL field and in DAEDATA output.

Application Identity Mapping Considerations

The conversion utility IRRIRA00 processes a RACF database to activate the function that controls the indexing of application identities for existing databases. IRRIRA00 is responsible for handling the non-RACF application identities that compose the alias index. The term 'alias' refers to any non-RACF application user identity (such as identities for products including Lotus Notes for z/OS, Novell Directory Services for OS/390, and z/OS UNIX System Services) that is part of this index structure.

For more information on the IRRIRA00 utility and the stages of application identity mapping, see *z/OS Security Server RACF System Programmer's Guide*.

IRRIRA00 activates this in four stages controlled by the installation and lists the current stage of the active primary database. Down-level systems do not have any support for application identity mapping, so errors might occur if the RACF database is shared by systems running releases prior to Version 2 Release 10. Therefore, we strongly recommend you make your changes from your Version 2 Release 10 system only. To prevent changes being made from a down-level system inadvertently, do one of the following before running IRRIRA00:

- Migrate all your systems to Version 2 Release 10
- Use the command protection steps described in *z/OS Security Server RACF Security Administrator's Guide*

The examples below point out problems that can occur when sharing the RACF database with a system running Version 2 Release 10 or higher that has the application identity mapping support at stage 1 or higher and a down-level system:

- You ADD a user or group profile with an application identity on a down-level system. The IRRUT200 report will run successfully on the Version 2 Release 10 system, but will show that the mapping profiles were created though no alias indices were ever created.

Considerations

- You ALTER an application identity field in a user or group profile with a different application identity on the down-level system. The IRRUT200 report will run successfully on the Version 2 Release 10 system, but will show that the new mapping profiles were created though the old alias indices still exist. You must also issue the LISTUSER or LISTGRP command or run DBUNLOAD and compare the output to the IRRUT200 output in order to see differences.
- You DELETE a user or group profile with a mapping on the down-level system. The IRRUT200 report will run successfully on the Version 2 Release 10 system, but will show the mapping profiles have been deleted though the old alias indices still exist.

Additionally, if base profiles containing application identities are incorrectly manipulated from a down-level system, the alias index will not be updated.

LOGREC data set entries for the alias index

In all stages the getUMAP, getGMAP, and R-usermap callable services will report unexpected ICHEINTY and RACROUTE return codes (non-zero return codes other than indicating the profile was not found) with a LOGREC entry. Additionally, if locating an alias index entry fails but a mapping profile is found for a database at Stage 2, the callable service will write an entry to the LOGREC data set with a return code of X'0000000C' and a reason code of X'00000000'. The presence of these LOGREC entries indicates that the alias index is not complete and must be corrected before moving to Stage 3. The variable data for services IRRRGM01 (GID to group name mapping service), IRRRUM01 (UID to user ID mapping service) and IRRRIM00 (application ID to RACF user ID mapping service) serves as the RACF group name or user ID and as the entry name specified on the locate request for the alias index entry.

Recovering from errors with Application Identity Mapping

Prior to stage 3, RACF maintains mapping profiles and functionality to ensure mapping compatibility with down-level systems that share a database with higher-level systems. This means the RACF database is susceptible to errors if a mapping profile is inadvertently deleted, or if the mapping profile is modified so that the alias index entry does not match the corresponding USER profile, as seen in the examples above.

With application identity mapping enabled at stage 3, RACF uses an alias index rather than mapping profiles to associate users and groups with specific application identities from products such as Lotus Notes for z/OS, Novell Directory Services for OS/390, or z/OS UNIX System Services. Though unlikely, it is possible that an unexpected error could cause an association mismatch that you can identify by comparing IRRUT200 alias index output with profile information returned from LISTUSER or LISTGRP (or DBUNLOAD). This section suggests methods to correct such inconsistencies.

If the mapping profile exists, and if your database is at stage 3, no profiles in class UNIXMAP, NOTELINK, or NDSLINK should exist. If you find one, you can ignore it just as RACF does. Otherwise, you can delete it using RDELETE. For example:

```
RDELETE UNIXMAP U1
```

If the mapping profile contains lowercase letters, you cannot specify them on the RDELETE command. You must use BLKUPD or RACROUTE to delete the profile.

If your database is at stage 1 or higher and you believe the profile to be incorrect, consider the following:

Considerations

- If the alias index entry is missing, and if your database is at stage 0, you should not expect to see any alias index.
- If your database is at stage 1 or higher and you do not find any alias index entry corresponding to a specified application identity, you can regenerate the entry by altering the user or group profile with the desired application identity. For example, you can issue:

```
ALTUSER YOURID OMVS(UID(1))
```

- If the mapping profile associated with a user does not exist but the alias index entry does exist (at stage 1 or 2), you can remove the entry by temporarily adding the referenced profile with the indicated application identity, and then deleting the profile. For example, you can issue:

```
ADDUSER YOURID OMVS(UID(1))  
DELUSER YOURID
```

- If an alias index entry references the incorrect user or group, but the user or group profile references a correct application identity, correct this by altering the user or group with the incorrect application identity, and then altering the user or group putting back the correct application identity. Suppose the alias index entry for the Lotus Notes for z/OS SNAME, USER1, references MYID rather than the desired YOURID. For example, you can issue:

```
ALTUSER MYID LNOTES(SNAME(USER1))  
ALTUSER YOURID LNOTES(SNAME(USER1))
```

Using SAF Trace to debug IBM HTTP server problems

SAF Trace may be used to debug IBM HTTP server problems related to an incorrect SAF keyring configuration. In this section we will cover the steps needed to provide the appropriate output to be analyzed. We will also provide sample data for you to compare your output to.

Before you begin

You need to determine if the IBM HTTP server is using SAF keyrings.

- Verify the following lines are in `httpd.main.conf`:

```
sslmode on  
sslport 443  
keyfile mysslring SAF
```

If the preceding lines do not exist in `httpd.main.conf`, **stop**, the following diagnostic procedure does not apply.

- If the operator console says:

```
00 ICH408I USER(WEBSEV ) GROUP(IMWEB ) NAME(#####)  
IRR.DIGTCERT.LISTRING CL(FACILITY)  
INSUFFICIENT ACCESS AUTHORITY  
ACCESS INTENT(READ ) ACCESS ALLOWED(NONE )
```

you must give WEBSEV READ access to IRR.DIGTCERT.LISTRING in the FACULTY class. WEBSEV is the ID assigned to the web server process.

Starting the trace

Perform the following steps to use SAF Trace to debug IBM HTTP server problems related to an incorrect SAF keyring configuration.

1. Turn SAF Trace on for IRRSDL00:
@SET TRACE(CALLABLE(TYPE(44)) JOBNAME(*))
2. Turn on GTF:

SAF Trace

```
start gtfracf.gtf,,,noprompt
```

The order of trace calls

SSL calls the r_datalib (IRRSDL00) callable service. For an error free SSL connection, SAF Trace will contain a pre and post record for the r_datalib functions in the order listed below.

DataGetFirst	initial DataGetFirst call that fails due to bad length of parameters
DataGetFirst	the first DataGetFirst call succeeds
CheckStatus	
DataGetNext	call fails due to bad length of parameters
DataGetNext	call succeeds
CheckStatus	
DataGetNext	call fails because there are no more certificates in the key ring
DataAbortQuery	the call ending the query

Examples of each of the post records

Note: This trace was generated by IRRTRC00 with IDENT(R_TACE).

DataGetFirst

```
Trace Identifier:          00000036
Record Eyecatcher:       RTRACE
Trace Type:              OMVSPPOST
Ending Sequence:         .....
Calling address:         00000000  A6168CFA
Requestor/Subsystem:     .....
Primary jobname:         IMWEBSRV
Primary asid:            00000022
Primary ACEEP:           00000000  009FFDC0
Home jobname:            IMWEBSRV
Home asid:               00000022
Home ACEEP:              00000000  009FFDC0
Task address:            00000000  009F0898
Task ACEEP:              00000000  00000000
Time:                    B5F9F4C7  804A5686
Error class:             .....
Service number:          00000029
RACF Return code:        00000000
RACF Reason code:        00000000
Return area address:     00000000  00000000
Parameter count:         00000029
Area length:             00000034
Area value:
2561D0C0 25615600 256155F4 25615604 | ./}{./.../.4./.. |
256155F8 25615608 256155FC 256154D1 | ./..8./.../.../.J |
2561560C 256154D2 2561D4C0 25615610 | ./.../.K./M{./.. |
A5615790 | v/.. |
Area length:             00000008
Area value:
D6C6C6E2 C5E30004 | OFFSET.. |
Area length:             00000004
Area value:
00000000 | .... |
```

```

Area length:          00000008
Area value:
D6C6C6E2 C5E30008   | OFFSET..   |
Area length:          00000004
Area value:
00000000             | ....      |
Area length:          00000008
Area value:
D6C6C6E2 C5E3000C   | OFFSET..   |
Area length:          00000004
Area value:
00000000             | ....      |
Area length:          00000008
Area value:
D6C6C6E2 C5E30010   | OFFSET..   |

```

Note: Offset 10 is the return code, which in this case is 0.

```

Area length:          00000004
Area value:
00000000             | ....      |
Area length:          00000008
Area value:
D6C6C6E2 C5E30014   | OFFSET..   |
Area length:          00000004
Area value:
00000000             | ....      |
Area length:          00000008
Area value:
D6C6C6E2 C5E30018   | OFFSET..   |

```

Note: Offset 18 is the reason code, which in this case is 0.

```

Area length:          00000004
Area value:
00000000             | ....      |
Area length:          00000008
Area value:
D6C6C6E2 C5E3001C   | OFFSET..   |

```

Note: Offset 1C is the Function code, which in this case is 01.. 01 is DataGetFirst

```

Area length:          00000001
Area value:
01                   | .          |
Area length:          00000008
Area value:
D6C6C6E2 C5E30020   | OFFSET..   |
Area length:          00000004
Area value:
00000000             | ....      |
Area length:          00000008
Area value:
D6C6C6E2 C5E30024   | OFFSET..   |
Area length:          00000001
Area value:
00                   | .          |
Area length:          00000008
Area value:
D6C6C6E2 C5E30028   | OFFSET..   |

```

Note: Offset 28 is the ring name found in .conf file, which in this case is MYSSLRING.

SAF Trace

```

Area length:          0000000A
Area value:
09D4E8E2 E2D3D9C9 D5C7 | .MYSSLRING |
Area length:          00000008
Area value:
D6C6C6E2 C5E3002C | OFFSET.. |
Area length:          00000004
Area value:
00000000 | .... |
Area length:          00000008
Area value:
D6C6C6E2 C5E30030 | OFFSET.. |

```

Note: Beginning with offset 30, the remaining offsets contain the function specific parameter list (FSPL).

```

Area length:          00000048
Area value:
256157D8 00000002 00000000 000002A5 | ./Q.....v |
256494B8 00000000 257DF558 00000000 | ..m.....'5.... |
00000000 00000009 256157EC 08899999 | ...../...irr |
838599A3 81000000 0000004F 257DF870 | certa.....|. '8. |
00000038 2561D5B0 | ...../N. |
Area length:          00000008
Area value:
D6C6C6E2 C5E30000 | OFFSET.. |
Area length:          00000014
Area value:
25C9A040 00000000 00000000 00000000 | .I. .... |
00000000 | .... |
Area length:          00000008
Area value:
D6C6C6E2 C5E30010 | OFFSET.. |

```

Note: Offset 10 is the certificate.

```

Area length:          000002A5
Area value:
308202A1 3082020A A0030201 02020100 | .b.~.b..... |
300D0609 2A864886 F70D0101 05050030 | .....f.f7..... |
4D310B30 09060355 04061302 55533118 | (..... |
30160603 55040A13 0F4D5920 434F4D50 | .....(....|(& |
414E592C 20494E43 31243022 06035504 | .+....+..... |
0B131B48 554D414E 20524553 4F555243 | .....(+....|... |
45532043 45525449 46494341 5445301E | ..... |
170D3031 30363038 30353030 30305A17 | .....!. |
0D323030 36313030 34353935 395A304D | .....!. ( |
310B3009 06035504 06130255 53311830 | ..... |
16060355 040A130F 4D592043 4F4D5041 | .....(....|(& |
4E592C20 494E4331 24302206 0355040B | +....+..... |
131B4855 4D414E20 5245534F 55524345 | ....(+....|... |
53204345 52544946 49434154 4530819F | .....a. |
300D0609 2A864886 F70D0101 01050003 | .....f.f7..... |
818D0030 81890281 8100B3E1 D36F32A3 | a...ai.aa...L?.t |
1ED16837 8EF47012 0F74E1F7 CA9BA924 | .J...4....7..z. |
456081F5 6A5EDD89 35CA9674 4984F141 | .-a5.;.i..o..dl. |
E44AB5E0 F1B0DC82 75216B53 6FE7AC57 | Uç.\1..b...?X.. |
D73D4ECD 16161537 E5E786A1 4C0A09A9 | P.+....VXf~<..z |
1464E572 35AD5F9C D40F1B55 45FDF230 | ..V...¼.M.....2. |
B0228334 E6ED2A0A 6B3AD28A B4AA789D | ..c.W....,K..... |
54FD84F2 1279B011 C767CCCC 26EE3ED4 | ..d2.~..G.....M |
013BD21F AEBFB074 6AE50203 010001A3 | ..K.....V.....t |
81903081 8D304B06 09551D0F 0186F842 | a..a.....f8. |
010D043E 133C4765 6E657261 74656420 | .....>../. |

```

```

62792074 68652053 65637572 65576179 | .~...../~ |
20536563 75726974 79205365 72766572 | .....^..... |
20666F72 204F532F 33393020 28524143 | ..?..|..... |
4629300E 0603551D 0F0101FF 04040302 | ..... |
0006300F 0603551D 130101FF 04053003 | ..... |
0101FF30 1D060355 1D0E0416 0414D79A | .....P. |
44A60457 328E9635 E655137D 52E787D4 | .w....o.W..'.XgM |
46D2300D 06092A86 4886F70D 01010505 | .K.....f.f7..... |
00038181 0052EECE 337B3893 19B9D56B | ..aa....#.l..N, |
AD725205 C97C4DE5 C16D13E3 1EEA02E6 | ....I@(VA_.T...W |
D00A29B1 CA6490CC 0ABAD5B9 6C61F417 | }.....N.%/4. |
95E207D5 CBE8B84B 1A7BD22A E3BC0154 | nS.N.Y...#K.T... |
FDE66400 8A4BB3DA 0D75D127 079743F5 | .W.....J..p.5 |
00ED5E58 DC4B1FF9 2937C930 E306B662 | ..;...9..I.T... |
0096DD5C BE80A812 5F859566 15D86B0C | .o.*.y.¼en..Q,. |
ECF12799 A58E813B 94FDF51E 45D9C3E2 | .l.rv.a.m.5..RCS |
27C64C2E BD | .F<.. |
Area length: 00000008
Area value:
D6C6C6E2 C5E30018 | OFFSET.. |

```

Note: Offset 18 is the private_key_ptr. In this case, the length of 0 indicates that there is no key.

```

Area length: 00000000
Area value:
Area length: 00000008
Area value:
D6C6C6E2 C5E30028 | OFFSET.. |

```

Note: Offset 28 is the label.

```

Area length: 00000009
Area value:
D4E840D7 D2C940C3 C1 | MY PKI CA |
Area length: 00000008
Area value:
D6C6C6E2 C5E3003C | OFFSET.. |
Area length: 0000004F
Area value:
304D310B 30090603 55040613 02555331 | .(..... |
18301606 0355040A 130F4D59 20434F4D | .....(..|(|
50414E59 2C20494E 43312430 22060355 | &.+...+..... |
040B131B 48554D41 4E205245 534F5552 | .....(+.....|.. |
43455320 43455254 49464943 415445 | ..... |
Area length: 00000008
Area value:
D6C6C6E2 C5E30044 | OFFSET.. |
Area length: 00000038

```

Note: Offset 44 is the Subjects_DN.

```

Area value:
F0F04BD6 E47EC8E4 D4C1D54A D9C5E2D6 | 00.OU=HUMAN&RESO |
E4D9C3C5 E24AC3C5 D9E3C9C6 C9C3C1E3 | URCES&CERTIFICAT |
C54BD67E D4E84AC3 D6D4D7C1 D5E86B4A | E.O=MY&COMPANY,& |
C9D5C34B C37EE4E2 | INC.C=US |
Area length: 000000A8
Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 07E6C5C2 E2C5D9E5 4005C9D4 | .....WEBSERV.IM |
E6C5C240 40400101 0501163F C9D4E6C5 | WEB .....IMWE |
C2E2D9E5 00000000 00000000 00000000 | BSRV..... |
40404040 40404040 00000000 00000000 | ..... |
00000000 00000000 40404040 40404040 | ..... |

```

SAF Trace

```

00000000 009FDF90 00000000 009FFA78 | ..... |
00000000 009FFAE0 00000000 0101163F | .....\..... |
00000000 00200000 00000000 00000000 | ..... |
00000000 00000000 009FFB48 00000000 | ..... |
00000000 009FFD70 | ..... |
Area length: 00000050
Area value:
50012004 0000C000 00000000 00000000 | &.....{..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
E6C5C2E2 C5D9E540 C9D4E6C5 C2404040 | WEBSERV IMWEB |
Area length: 00000090
Area value:
C1C3C5E7 03000000 00000000 00000000 | ACEX..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000024 009FE008 00000000 | .....\..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 7F877040 00000000 | ..... "g. .... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |

```

```

Area length: 00000000
Area value:

```

Hexadecimal dump of record follows:

```

+0000 00000036 D9E3D9C1 C3C54040 D6D4E5E2 | ....RTRACE OMVS |
+0010 D7D6E2E3 00000000 00000000 00000000 | POST..... |
+0020 00000000 00000000 00000000 00000000 | ..... |
+0030 A6168CFA 00000000 00000000 40400000 | w..... |
+0040 00000000 00000000 00000000 00000000 | ..... |
+0050 00000000 00000000 009F0898 00000000 | .....q.... |
+0060 00F55C80 00000000 00F55C80 00000022 | .5*.....5*.... |
+0070 00000022 C9D4E6C5 C2E2D9E5 C9D4E6C5 | ... IMWEBSRVIMWE |
+0080 C2E2D9E5 00000000 009FFDC0 00000000 | BSRV.....{.... |
+0090 009FFDC0 00000000 00000000 B5F9F4C7 | ..{.....94G |
+00A0 804A5686 00000000 00000000 00000000 | .c.f..... |
+00B0 00000029 00000029 00000034 2561D0C0 | ...../}{ |
+00C0 25615600 256155F4 25615604 256155F8 | ./.../.4./.../.8 |
+00D0 25615608 256155FC 256154D1 2561560C | ./.../.../..J./.. |
+00E0 256154D2 2561D4C0 25615610 A5615790 | ./..K./M{/...v/.. |
+00F0 00000008 D6C6C6E2 C5E30004 00000004 | ....OFFSET..... |
+0100 00000000 00000008 D6C6C6E2 C5E30008 | .....OFFSET.. |
+0110 00000004 00000000 00000008 D6C6C6E2 | .....OFFS |
+0120 C5E3000C 00000004 00000000 00000008 | ET..... |
+0130 D6C6C6E2 C5E30010 00000004 00000000 | OFFSET..... |
+0140 00000008 D6C6C6E2 C5E30014 00000004 | ....OFFSET..... |
+0150 00000000 00000008 D6C6C6E2 C5E30018 | .....OFFSET.. |
+0160 00000004 00000000 00000008 D6C6C6E2 | .....OFFS |
+0170 C5E3001C 00000001 01000000 08D6C6C6 | ET.....OFF |
+0180 E2C5E300 20000000 04000000 00000000 | SET..... |
+0190 08D6C6C6 E2C5E300 24000000 01000000 | .OFFSET..... |
+01A0 0008D6C6 C6E2C5E3 00280000 000A09D4 | ..OFFSET.....M |
+01B0 E8E2E2D3 D9C9D5C7 00000008 D6C6C6E2 | YSSLRING....OFFS |
+01C0 C5E3002C 00000004 00000000 00000008 | ET..... |
+01D0 D6C6C6E2 C5E30030 00000048 256157D8 | OFFSET...../.Q |
+01E0 00000002 00000000 000002A5 256494B8 | .....v..m. |
+01F0 00000000 257DF558 00000000 00000000 | .....5..... |
+0200 00000009 256157EC 08899999 838599A3 | ...../...irrcert |
+0210 81000000 0000004F 257DF870 00000038 | a.....|. '8.... |
+0220 2561D5B0 00000008 D6C6C6E2 C5E30000 | ./N....OFFSET.. |
+0230 00000014 25C9A040 00000000 00000000 | .....I. .... |
+0240 00000000 00000000 00000008 D6C6C6E2 | .....OFFS |
+0250 C5E30010 000002A5 308202A1 3082020A | ET.....v.b.~.b.. |
+0260 A0030201 02020100 300D0609 2A864886 | .....f.f |
+0270 F70D0101 05050030 4D310B30 09060355 | 7.....(..... |

```

+0280	04061302	55533118	30160603	55040A13	.....
+0290	0F4D5920	434F4D50	414E592C	20494E43	.(...|(&+....+. .
+02A0	31243022	06035504	0B131B48	554D414E(.+ .
+02B0	20524553	4F555243	45532043	45525449	....|.....
+02C0	46494341	5445301E	170D3031	30363038	.....
+02D0	30353030	30305A17	0D323030	36313030!.....
+02E0	34353935	395A304D	310B3009	06035504!(.....
+02F0	06130255	53311830	16060355	040A130F	.....
+0300	4D592043	4F4D5041	4E592C20	494E4331	(...|(&+....+. .
+0310	24302206	0355040B	131B4855	4D414E20(.+ .
+0320	5245534F	55524345	53204345	52544946	....|.....
+0330	49434154	4530819F	300D0609	2A864886	.....a.....f.f
+0340	F70D0101	01050003	818D0030	81890281	7.....a....ai.a
+0350	8100B3E1	D36F32A3	1ED16837	8EF47012	a...L?.t.J...4..
+0360	0F74E1F7	CA9BA924	456081F5	6A5EDD89	..7..z..-a5.;.i
+0370	35CA9674	4984F141	E44AB5E0	F1B0DC82	..o..d1.Uç.\1..b
+0380	75216B53	6FE7AC57	D73D4ECD	16161537	...?X..P+....
+0390	E5E786A1	4C0A09A9	1464E572	35AD5F9C	VXf~<..z..V...¼.
+03A0	D40F1B55	45FDF230	B0228334	E6ED2A0A	M.....2....c.W... .
+03B0	6B3AD28A	B4AA789D	54FD84F2	1279B011	..K.....d2.`..
+03C0	C767CCCC	26EE3ED4	013BD21F	AEBFB074	G.....M..K.....
+03D0	6AE50203	010001A3	81903081	8D304B06	.V.....ta..a....
+03E0	09551D0F	0186F842	010D043E	133C4765	.....f8.....
+03F0	6E657261	74656420	62792074	68652053	>../......`.....
+0400	65637572	65576179	20536563	75726974/`.....
+0410	79205365	72766572	20666F72	204F532F	`.....?..|..
+0420	33393020	28524143	4629300E	0603551D	.....
+0430	0F0101FF	04040302	0006300F	0603551D	.....
+0440	130101FF	04053003	0101FF30	1D060355	.....
+0450	1D0E0416	0414D79A	44A60457	328E9635	.....P..w....o.
+0460	E655137D	52E787D4	46D2300D	06092A86	W..'.XgM.K.....f
+0470	4886F70D	01010505	00038181	0052EECE	.f7.....aa....
+0480	337B3893	19B9D56B	AD725205	C97C4DE5	..#.l..N,....I@{V
+0490	C16D13E3	1EEA02E6	D00A29B1	CA6490CC	A..T...W}.....
+04A0	0ABAD5B9	6C61F417	95E207D5	CBE8B84B	..N.%/4.nS.N.Y..
+04B0	1A7BD22A	E3BC0154	FDE66400	8A4BB3DA	..#K.T...W.....
+04C0	0D75D127	079743F5	00ED5E58	DC4B1FF9	..J..p.5...;...9
+04D0	2937C930	E306B662	0096DD5C	BE80A812	..I.T....o.*..y.
+04E0	5F859566	15D86B0C	ECF12799	A58E813B	¼en..Q, .l.rv.a.
+04F0	94FDF51E	45D9C3E2	27C64C2E	BD000000	m.5..RCS.F<....
+0500	08D6C6C6	E2C5E300	18000000	00000000	.OFFSET.....
+0510	08D6C6C6	E2C5E300	28000000	09D4E840	.OFFSET.....MY
+0520	D7D2C940	C3C10000	0008D6C6	C6E2C5E3	PKI CA...OFFSET
+0530	003C0000	004F304D	310B3009	06035504	.....|.(.....
+0540	06130255	53311830	16060355	040A130F	.....
+0550	4D592043	4F4D5041	4E592C20	494E4331	(...|(&+....+. .
+0560	24302206	0355040B	131B4855	4D414E20(.+ .
+0570	5245534F	55524345	53204345	52544946	....|.....
+0580	49434154	45000000	08D6C6C6	E2C5E300	.....OFFSET.
+0590	44000000	38F0F04B	D6E47EC8	E4D4C1D5	.....00.OU=HUMAN
+05A0	4AD9C5E2	D6E4D9C3	C5E24AC3	C5D9E3C9	çRESOURCESçCERTI
+05B0	C6C9C3C1	E3C54BD6	7ED4E84A	C3D6D4D7	FICATE.O=MYçCOMP
+05C0	C1D5E86B	4AC9D5C3	4BC37EE4	E2000000	ANY,çINC.C=US...
+05D0	A8C1C3C5	C5FF0000	A8020000	00000000	yACEE...y.....
+05E0	00000000	0007E6C5	C2E2C5D9	E54005C9	.....WEBSERV .I
+05F0	D4E6C5C2	40404001	01050116	3FC9D4E6	MWEB .....IMW
+0600	C5C2E2D9	E5000000	00000000	00000000	EBSRV.....
+0610	00404040	40404040	40000000	00000000	.....
+0620	00000000	00000000	00404040	40404040	.....
+0630	40000000	00009FFD	90000000	00009FFA	.....
+0640	78000000	00009FFA	E0000000	00010116\.....
+0650	3F000000	00002000	00000000	00000000	.....OFFSET
+0660	00000000	00000000	00009FFB	48000000	.....
+0670	00000000	00009FFD	70000000	50500120&&..
+0680	040000C0	00000000	00000000	00000000	...{.....
+0690	00000000	00000000	00000000	00000000	.....
+06A0	00000000	00000000	00000000	00000000	.....


```

AD725205 C97C4DE5 C16D13E3 1EEA02E6 | ....I@(_VA_.T...W
D00A29B1 CA6490CC 0ABAD5B9 6C61F417 | }.....N.%/4.
95E207D5 CBE8B84B 1A7BD22A E3BC0154 | nS.N.Y...#K.T...
FDE66400 8A4BB3DA 0D75D127 079743F5 | .W.....J..p.5
00ED5E58 DC4B1FF9 2937C930 E306B662 | ..;...9..I.T...
0096DD5C BE80A812 5F859566 15D86B0C | .o.*..y.½en..Q,.
ECF12799 A58E813B 94FDF51E 45D9C3E2 | .l.rv.a.m.5..RCS
27C64C2E BD | .F<..
Area length: 000000A8
Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y.....
00000000 07E6C5C2 E2C5D9E5 4005C9D4 | .....WEBSERV.IM
E6C5C240 40400101 0501163F C9D4E6C5 | WEB .....IMWE
C2E2D9E5 00000000 00000000 00000000 | BSRV.....
40404040 40404040 00000000 00000000 | .....
00000000 00000000 40404040 40404040 | .....
00000000 009FDF90 00000000 009FFA78 | .....
00000000 009FFAE0 00000000 0101163F | .....\.
00000000 00200000 00000000 00000000 | .....
00000000 00000000 009FFB48 00000000 | .....
00000000 009FFD70 | .....
Area length: 00000050
Area value:
50012004 0000C000 00000000 00000000 | &....{.....
00000000 00000000 00000000 00000000 | .....
00000000 00000000 00000000 00000000 | .....
00000000 00000000 00000000 00000000 | .....
E6C5C2E2 C5D9E540 C9D4E6C5 C2404040 | WEBSERV IMWEB
Area length: 00000090
Area value:
C1C3C5E7 03000000 00000000 00000000 | ACEX.....
00000000 00000000 00000000 00000000 | .....
00000000 00000024 009FE008 00000000 | .....\.
00000000 00000000 00000000 00000000 | .....
00000000 00000000 7F877040 00000000 | ..... "g. ....
00000000 00000000 00000000 00000000 | .....
00000000 00000000 00000000 00000000 | .....
00000000 00000000 00000000 00000000 | .....
00000000 00000000 00000000 00000000 | .....
Area length: 00000000
Area value:
Hexadecimal dump of record follows:
+0000 00000036 D9E3D9C1 C3C54040 D6D4E5E2 | ....RTRACE OMVS
+0010 D7D6E2E3 00000000 00000000 00000000 | POST.....
+0020 00000000 00000000 00000000 00000000 | .....
+0030 A6168F34 00000000 00000000 40400000 | w.....
+0040 00000000 00000000 00000000 00000000 | .....
+0050 00000000 00000000 009F0898 00000000 | .....q....
+0060 00F55C80 00000000 00F55C80 00000022 | .5*.....5*....
+0070 00000022 C9D4E6C5 C2E2D9E5 C9D4E6C5 | ....IMWEBSRVIMWE
+0080 C2E2D9E5 00000000 009FFDC0 00000000 | BSRV.....{....
+0090 009FFDC0 00000000 00000000 B5F9F4C7 | ..{.....94G
+00A0 80C66C46 00000000 00000000 00000000 | .F%.....
+00B0 0000001F 00000029 00000034 2561D0C0 | ...../}{
+00C0 25615600 256155F4 25615604 256155F8 | ./.../.4./.../.8
+00D0 25615608 256155FC 256154D0 2561560C | ./.../..././..
+00E0 256154D2 2561D4C0 25615610 A561554C | ./..K./M{/./..v/.<
+00F0 00000008 D6C6C6E2 C5E30004 00000004 | ....OFFSET.....
+0100 00000000 00000008 D6C6C6E2 C5E30008 | .....OFFSET..
+0110 00000004 00000000 00000008 D6C6C6E2 | .....OFFS
+0120 C5E3000C 00000004 00000000 00000008 | ET.....
+0130 D6C6C6E2 C5E30010 00000004 00000000 | OFFSET.....
+0140 00000008 D6C6C6E2 C5E30014 00000004 | ...OFFSET.....
+0150 00000000 00000008 D6C6C6E2 C5E30018 | .....OFFSET..
+0160 00000004 00000000 00000008 D6C6C6E2 | .....OFFS
+0170 C5E3001C 00000001 04000000 08D6C6C6 | ET.....OFF
+0180 E2C5E300 20000000 04000000 00000000 | SET.....

```

SAF Trace

+0190	08D6C6C6	E2C5E300	24000000	01000000	.OFFSET.....
+01A0	0008D6C6	C6E2C5E3	00280000	000A09D4	..OFFSET.....M
+01B0	E8E2E2D3	D9C9D5C7	00000008	D6C6C6E2	YSSLRING....OFFS
+01C0	C5E3002C	00000004	00000000	00000008	ET.....
+01D0	D6C6C6E2	C5E30030	00000008	000002A5	OFFSET.....v
+01E0	256494B8	00000008	D6C6C6E2	C5E30004	..m....OFFSET..
+01F0	000002A5	308202A1	3082020A	A0030201	...v.b.~.b.....
+0200	02020100	300D0609	2A864886	F70D0101	.....f.f7...
+0210	05050030	4D310B30	09060355	04061302(.....
+0220	55533118	30160603	55040A13	0F4D5920(..
+0230	434F4D50	414E592C	20494E43	31243022	.|(&+....+....
+0240	06035504	0B131B48	554D414E	20524553(+....
+0250	4F555243	45532043	45525449	46494341	|.....
+0260	5445301E	170D3031	30363038	30353030	.....
+0270	30305A17	0D323030	36313030	34353935	..!.....
+0280	395A304D	310B3009	06035504	06130255	..!(.....
+0290	53311830	16060355	040A130F	4D592043(....
+02A0	4F4D5041	4E592C20	494E4331	24302206	|(&+....+....
+02B0	0355040B	131B4855	4D414E20	5245534F	.....(+....|
+02C0	55524345	53204345	52544946	49434154	.....
+02D0	4530819F	300D0609	2A864886	F70D0101	..a.....f.f7...
+02E0	01050003	818D0030	81890281	8100B3E1	....a...ai.aa...
+02F0	D36F32A3	1ED16837	8EF47012	0F74E1F7	L?.t.J...4...7
+0300	CA9BA924	456081F5	6A5EDD89	35CA9674	..z...-a5.;i..o.
+0310	4984F141	E44AB5E0	F1B0DC82	75216B53	.d1.Uç.\1..b...;
+0320	6FE7AC57	D73D4ECD	16161537	E5E786A1	?X..P.+....VXf~
+0330	4C0A09A9	1464E572	35AD5F9C	D40F1B55	<.z..V...¼.M...
+0340	45FDF230	B0228334	E6ED2A0A	6B3AD28A	..2...c.W...;.K.
+0350	B4AA789D	54FD84F2	1279B011	C767CCCC	.....d2.`.G...
+0360	26EE3ED4	013BD21F	AEBFB074	6AE50203	..M..K...V...
+0370	010001A3	81903081	8D304B06	09551D0F	...ta..a.....
+0380	0186F842	010D043E	133C4765	6E657261	.f8.....>./
+0390	74656420	62792074	68652053	65637572`.....
+03A0	65576179	20536563	75726974	79205365	../'.....`....
+03B0	72766572	20666F72	204F532F	33393020	.....?..|.....
+03C0	28524143	4629300E	0603551D	0F0101FF	.....
+03D0	04040302	0006300F	0603551D	130101FF	.....
+03E0	04053003	0101FF30	1D060355	1D0E0416	.....
+03F0	0414D79A	44A60457	328E9635	E655137D	..P..w...o.W...'
+0400	52E787D4	46D2300D	06092A86	4886F70D	.XgM.K....f.f7.
+0410	01010505	00038181	0052EECE	337B3893	.....aa....#.1
+0420	19B9D56B	AD725205	C97C4DE5	C16D13E3	..N,...IE@VA_T
+0430	1EEA02E6	D00A29B1	CA6490CC	0ABAD5B9	..W}.....N.
+0440	6C61F417	95E207D5	CBE8B84B	1A7BD22A	%/4.nS.N.Y...#K.
+0450	E3BC0154	FDE66400	8A4BB3DA	0D75D127	T...W.....J.
+0460	079743F5	00ED5E58	DC4B1FF9	2937C930	.p.5.;...9..I.
+0470	E306B662	0096DD5C	BE80A812	5F859566	T...o.*.y.½en.
+0480	15D86B0C	ECF12799	A58E813B	94FDF51E	.Q...l.rv.a.m.5.
+0490	45D9C3E2	27C64C2E	BD000000	A8C1C3C5	.RCS.F<.....yACE
+04A0	C5FF0000	A8020000	00000000	00000000	E...y.....
+04B0	0007E6C5	C2E2C5D9	E54005C9	D4E6C5C2	..WEBSERV .IMWEB
+04C0	40404001	01050116	3FC9D4E6	C5C2E2D9	.....IMWEBSR
+04D0	E5000000	00000000	00000000	00404040	V.....
+04E0	40404040	40000000	00000000	00000000	.....
+04F0	00000000	00404040	40404040	40000000	.....
+0500	00009FDF	90000000	00009FFA	78000000	.....
+0510	00009FFA	E0000000	00010116	3F000000	...\......
+0520	00002000	00000000	00000000	00000000	.....
+0530	00000000	00009FFB	48000000	00000000	.....
+0540	00009FFD	70000000	50500120	040000C0&&.....{
+0550	00000000	00000000	00000000	00000000	.....
+0560	00000000	00000000	00000000	00000000	.....
+0570	00000000	00000000	00000000	00000000	.....
+0580	00000000	00000000	00E6C5C2	E2C5D9E5	.....WEBSERV
+0590	40C9D4E6	C5C24040	40000000	90C1C3C5	IMWEB ....ACE
+05A0	E7030000	00000000	00000000	00000000	X.....
+05B0	00000000	00000000	00000000	00000000	.....

```

+05C0 00000000 24009FE0 08000000 00000000 | .....\.
+05D0 00000000 00000000 00000000 00000000 | .....
+05E0 00000000 007F8770 40000000 00000000 | ..... "g.
+05F0 00000000 00000000 00000000 00000000 | .....
+0600 00000000 00000000 00000000 00000000 | .....
+0610 00000000 00000000 00000000 00000000 | .....
+0620 00000000 00000000 00000000 00000000 | .....
+0630 00          | .

```

DataGetNext

The resulting example output is the same as a **DataGetFirst** example.

DataAbortQuery

Your results may contain a certificate. This particular DataAbortQuery follows a DataGetNext that failed because there were no certificates in the key ring.

```

D6C6C6E2 C5E30030 | OFFSET.. |
Area length:          00000004
Area value:
256157D8 | ./..Q |
Area length:          00000008
Area value:
D6C6C6E2 C5E30000 | OFFSET.. |
Area length:          00000014
Area value:
00000000 00000000 00000000 00000000 | ..... |
00000000 | .... |
Area length:          000000A8
Area value:
C1C3C5C5 FF0000A8 02000000 00000000 | ACEE...y..... |
00000000 07E6C5C2 E2C5D9E5 4005C9D4 | .....WEBSERV .IM |
E6C5C240 40400101 0501163F C9D4E6C5 | WEB .....IMWE |
C2E2D9E5 00000000 00000000 00000000 | BSRV..... |
40404040 40404040 00000000 00000000 | ..... |
00000000 00000000 40404040 40404040 | ..... |
00000000 009FDF90 00000000 009FFA78 | ..... |
00000000 009FFAE0 00000000 0101163F | .....\. |
00000000 00200000 00000000 00000000 | ..... |
00000000 00000000 009FFB48 00000000 | ..... |
00000000 009FFD70 | ..... |
Area length:          00000050
Area value:
50012004 0000C000 00000000 00000000 | &.....{..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
E6C5C2E2 C5D9E540 C9D4E6C5 C2404040 | WEBSERV IMWEB |
Area length:          00000090
Area value:
C1C3C5E7 03000000 00000000 00000000 | ACEX..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000024 009FE008 00000000 | .....\. |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 7F877040 00000000 | ..... "g. |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
00000000 00000000 00000000 00000000 | ..... |
Area length:          00000000
Area value:
Hexadecimal dump of record follows:
+0000 00000036 D9E3D9C1 C3C54040 D6D4E5E2 | ....RTRACE OMVS |
+0010 D7D6E2E3 00000000 00000000 00000000 | POST..... |
+0020 00000000 00000000 00000000 00000000 | ..... |
+0030 A616A852 00000000 00000000 40400000 | w.y..... |
+0040 00000000 00000000 00000000 00000000 | ..... |

```

SAF Trace

+0050	00000000	00000000	009F0898	00000000	.....q....
+0060	00F55C80	00000000	00F55C80	00000022	.5*.....5*.....
+0070	00000022	C9D4E6C5	C2E2D9E5	C9D4E6C5	....IMWEBSRVIMWE
+0080	C2E2D9E5	00000000	009FFDC0	00000000	BSRV.....{.....
+0090	009FFDC0	00000000	00000000	B5F9F4C7	...{.....94G
+00A0	84F95A2C	00000000	00000000	00000000	d9!.....
+00B0	0000001F	00000029	00000034	2561D0C0/}{
+00C0	25615600	256155F4	25615604	256155F8	./.../.4./.../.8
+00D0	25615608	256155FC	256154D1	2561560C	./.../.../J./..
+00E0	256154D2	2561D4C0	25615610	A5615790	./..K./M{/...v/..
+00F0	00000008	D6C6C6E2	C5E30004	00000004	....OFFSET.....
+0100	00000000	00000008	D6C6C6E2	C5E30008	.....OFFSET..
+0110	00000004	00000000	00000008	D6C6C6E2	.....OFFS
+0120	C5E3000C	00000004	00000000	00000008	ET.....
+0130	D6C6C6E2	C5E30010	00000004	00000000	OFFSET.....
+0140	00000008	D6C6C6E2	C5E30014	00000004	....OFFSET.....
+0150	00000000	00000008	D6C6C6E2	C5E30018	.....OFFSET..
+0160	00000004	00000000	00000008	D6C6C6E2	.....OFFS
+0170	C5E3001C	00000001	03000000	08D6C6C6	ET.....OFF
+0180	E2C5E300	20000000	04000000	00000000	SET.....
+0190	08D6C6C6	E2C5E300	24000000	01000000	.OFFSET.....
+01A0	0008D6C6	C6E2C5E3	00280000	00A0A9D4	..OFFSET.....M
+01B0	E8E2E2D3	D9C9D5C7	00000008	D6C6C6E2	YSSLRING....OFFS
+01C0	C5E3002C	00000004	00000000	00000008	ET.....
+01D0	D6C6C6E2	C5E30030	00000004	256157D8	OFFSET...../ Q
+01E0	00000008	D6C6C6E2	C5E30000	00000014	....OFFSET.....
+01F0	00000000	00000000	00000000	00000000	.....
+0200	00000000	000000A8	C1C3C5C5	FF0000A8	.....yACEE...y
+0210	02000000	00000000	00000000	07E6C5C2	.....WEB
+0220	E2C5D9E5	4005C9D4	E6C5C240	40400101	SERV .IMWEB ..
+0230	0501163F	C9D4E6C5	C2E2D9E5	00000000	....IMWEBSRV....
+0240	00000000	00000000	40404040	40404040	.....
+0250	00000000	00000000	00000000	00000000	.....
+0260	40404040	40404040	00000000	009FDF90	.....
+0270	00000000	009FFA78	00000000	009FFAE0\
+0280	00000000	0101163F	00000000	00200000	.....
+0290	00000000	00000000	00000000	00000000	.....
+02A0	009FFB48	00000000	00000000	009FFD70	.....
+02B0	00000050	50012004	0000C000	00000000	..&&.....{.....
+02C0	00000000	00000000	00000000	00000000	.....
+02D0	00000000	00000000	00000000	00000000	.....
+02E0	00000000	00000000	00000000	00000000	.....
+02F0	00000000	E6C5C2E2	C5D9E540	C9D4E6C5	....WEBSERV IMWE
+0300	C2404040	00000090	C1C3C5E7	03000000	B ....ACEX....
+0310	00000000	00000000	00000000	00000000	.....
+0320	00000000	00000000	00000000	00000024	.....
+0330	009FE008	00000000	00000000	00000000	..\......
+0340	00000000	00000000	00000000	00000000	.....
+0350	7F877040	00000000	00000000	00000000	"g.
+0360	00000000	00000000	00000000	00000000	.....
+0370	00000000	00000000	00000000	00000000	.....
+0380	00000000	00000000	00000000	00000000	.....
+0390	00000000	00000000	00000000	00000000	.....

Using the trace to find problems

If SSL doesn't start, or starts but SSL handshake does not occur, turn on trace and restart the web server. Calls to `r_datalib` occur when the web server is being started. You should be able to tell from the list below what went wrong based on the trace you received. For the following trace examples, important trace information will be followed by an explanatory note.

- **First DataGetFirst contains a return code of 8 with a reason code of 54**

All trace results above offset 8 are not shown. The sample trace follows:

```
Area value:
D6C6C6E2 C5E30010 | OFFSET.. |
```

Note: Offset 10 is the return code

```
Area length:          00000004
Area value:
00000008             | ....             |
```

Note: Hex 8 in the return code value

```
Area length:          00000008
Area value:
D6C6C6E2 C5E30014   | OFFSET..        |
Area length:          00000004
Area value:
00000000             | ....             |
Area length:          00000008
Area value:
D6C6C6E2 C5E30018   | OFFSET..        |
```

Note: Offset 18 is the reason code

```
D6C6C6E2 C5E30018   | OFFSET..        |
Area length:          00000004
Area value:
00000054             | ....             |
```

Note: Hex 54 is the reason code value

54 in hex is equal to a reason code of 80 which for this function is reason: Profile for ring_name not found. The next step for fixing this problem would be to look at the trace at offset 28 and compare the ring name found there with the one in the keyfile section of the .conf file. An example of output at offset 28 is the first DataGetFirst example above. Check that the ring name is correct. Note, ring names are case sensitive and must be owned by the web server daemon user ID (WEBSRV by default). This can be checked using the RACDCERT LISTRING TSO command.

- **SSL doesn't start on the server and there are no traces.**

Check the keyfile like in the http.main.conf file. It should look like this:

```
keyfile MYSSLRING SAF
```

If the SAF positional parameter is missing, then System SSL treats the name as a GSKKMAN key file, not a RACF keyring, hence there will be no trace. If the keyfile really is a RACF keyring, add the SAF positional parameter.

- **Second DataGetNext has a reason code 2C.**

Hex 2C is reason code 44: Record not found. This means that there is a problem with one of the two certificates attached to the ring. To find out what exactly is wrong, some more research is needed.

In order for SSL to function properly the key ring needs:

- to be owned by the ID who assigned to the web server process
- to contain a signing CERTAUTH certificate with CERTAUTH usage
- to contain a PERSONAL certificate owned by the ID who is assigned to the web server process. This certificate must also be signed by the CERTAUTH certificate and be marked DEFAULT.
- to have neither certificate marked NOTRUST

To learn what could be wrong at this point a RACDCERT should be issued:

```
RACDCERT ID(webserver-user-id) LISTRING(MYSSLRING)
```

SAF Trace

WEBSERV is the name of the ID who assigned to the web server process. MYSSLRING is the name listed in the keyfile section of the .conf file. The output should be similar to the following example:

```
Ring:
      >MYSSLRING<
Certificate Label Name      Cert Owner      USAGE      DEFAULT
-----
MY PKI CA                  CERTAUTH       CERTAUTH   NO
SSL CERT                   ID(WEBSERV)    PERSONAL   YES
```

Looking at this output will verify most of the above conditions.

The output: "IRRD114I Ring MYSSLRING does not exist." indicates that the ring in the .conf file doesn't exist, or that it is not owned by the ID assigned to the web server process.

To check the signer of the PERSONAL certificate is the CERTAUTH certificate and that neither certificate is marked NOTRUST, other commands must be used.

Using the above certificate label names, the commands and output are listed below.

Command:

```
RACDCERT ID(WEBSERV) LIST(LABEL('SSL CERT'))
```

Output:

```
Label: SSL CERT
Certificate ID: 2QfmxCLixdn14uLTQMPF2eNA
Status: TRUST
Start Date: 2001/06/25 00:00:00
End Date: 2002/06/25 23:59:59
Serial Number:
      >01<
Issuer's Name:
      >OU=HUMAN RESOURCES CERTIFICATE.O=MY COMPANY, INC.C=US<
Subject's Name:
      >CN=WWW.MYCOMPANY.COM.O=MY COMPANY INC.L=MILLBROOK.SP=NEW YORK.C=US<
Private Key Type: Non-ICSF
Private Key Size: 1024
Ring Associations:
  Ring Owner: WEBSERV
  Ring:
    >MYSSLRING<
```

Command:

```
RACDCERT CERTAUTH LIST(LABEL('MY PKI CA'))
```

Output:

```
Label: MY PKI CA
Certificate ID: 2QiJmZmDhZmjgdToQNfSyUDDwUBA
Status: TRUST
Start Date: 2001/06/08 00:00:00
End Date: 2020/06/09 23:59:59
Serial Number:
      >00<
Issuer's Name:
      >OU=HUMAN RESOURCES CERTIFICATE.O=MY COMPANY, INC.C=US<
Subject's Name:
```

```
>OU=HUMAN RESOURCES CERTIFICATE.O=MY COMPANY, INC.C=US<  
Key Usage: CERTSIGN  
Private Key Type: Non-ICSF  
Private Key Size: 1024  
Ring Associations:  
  Ring Owner: WEBSERV  
  Ring:  
    >MYSSLRING<
```

Note: Both certificates have TRUST status and the PERSONAL certificate was issued by the CERTAUTH certificate.

Compare your results with the examples provided to evaluate your situation for common IBM HTTP Server related problems related to an incorrect SAF keyring configuration. If you need additional assistance when you are done, you may want to consider calling the IBM support center.

SAF Trace

Chapter 3. Reporting RACF problems to IBM

Prerequisites

See “Troubleshooting the problem” on page 1 and the diagnostic procedures for this type of problem.

You also need to understand the procedures for reporting a problem to the IBM support center.

Introduction to procedure

This section describes the information that you need to collect before you report any RACF problems to IBM. The procedure lists only the information that the IBM support center is most likely to request.

When you report a problem, you need to describe your system and the problem that you experienced. The people at the IBM support center use this information to see whether your problem is already known to IBM and to check whether a fix is available.

Note: If you have the Information/MVS or Information/Access product, or a similar problem-search tool, you can do checking for a duplicate known problem yourself. “Performing a preliminary search for a matching problem” on page 34 and “Searching for a matching problem” on page 78 have advice on which RACF symptoms to use in search arguments for search tools.

If you report a new, unique problem, you need to provide additional problem information.

Procedure

Before calling IBM, collect the information called for in the worksheet for your type of problem. See Figures 4 through 12 for the applicable worksheet.

Consider collecting all the information on the worksheets before reporting the problem, to speed up your phone conversation if the support center needs the information.

The support center people usually want you to provide the information in the same order as in the checklist.

Recommendations

1. Before you call, you need to have a listing or an interactive display ready that shows any problem information that you obtained from a system dump or another data set.
2. For the most efficient phone conversations with IBM, consider having IPCS (Interactive Problem Control System) ready for interactive dump displays during the conversation. “Formatting a system dump” on page 42 has advice about using IPCS.

Procedure

For the complete list of diagnostic procedures for each type of problem, see “Troubleshooting tables for problems in RACF” on page 7.

Information to Gather before Calling IBM with Abend Problems

You can use this worksheet to write on directly or as a guide for making your own notes elsewhere.

1. Level of z/OS: _____ (Example: z/OS Version 1 Release 1)
2. RACF is enabled for sysplex communication: _____
 - non-data sharing mode _____
 - data sharing mode _____
 - read-only mode _____
3. System is configured as an RRSF node: _____
 - local mode _____
 - remote mode _____
4. PTF level of abending module: _____ (Example: UW27135)
5. Installation exits installed (which exits are used and what they do):
6. User modifications, if any (which modules are modified and what the modifications do):
7. **Any** recent changes (such as maintenance applied, Security Server options changed, new program products, new hardware):
8. A formatted system dump with options: SUMMARY SUNDUMP FORMAT CURRENT TRACE LOGDATA LPAMAP CPUDATA SYMPTOMS
9. The message that contains the abend code: _____ **Complete** message text:
10. Assembler listing, if source is available.
11. If a hardware problem is suspected, EREP (error recording and editing program) records.

Figure 4. Information to Gather before Calling IBM with Abend Problems

Information to Gather before Calling IBM with Documentation Problems

You can use this worksheet to write on directly or as a guide for making your own notes elsewhere.

1. Level of z/OS: _____ (Example: z/OS Version 1 Release 1)
2. RACF is enabled for sysplex communication: _____
 - non-data sharing mode _____
 - data sharing mode _____
 - read-only mode _____
3. System is configured as an RRSF node: _____
 - local mode _____
 - remote mode _____
4. Installation exits installed (which exits are used and what they do):
5. User modifications, if any (which modules are modified and what the modifications do):
6. Publication title and order number (with dash level):
7. Page number or topic number: _____

Figure 5. Information to Gather before Calling IBM with Documentation Problems

Information to Gather before Calling IBM with Output Problems

You can use this worksheet to write on directly or as a guide for making your own notes elsewhere.

1. Level of z/OS: _____ (Example: z/OS Version 1 Release 1)
2. RACF is enabled for sysplex communication: _____
 - non-data sharing mode _____
 - data sharing mode _____
 - read-only mode _____
3. System is configured as an RRSF node: _____
 - local mode _____
 - remote mode _____
4. Installation exits installed (which exits are used and what they do):
5. User modifications, if any (which modules are modified and what the modifications do):
6. **Any** recent changes (such as maintenance applied, RACF options changed, new program products, new hardware):
7. Description of RACF request that caused incorrect output (who did it—user's attributes, routine running, or both—and what was done):
8. IBM reference material that explains what correct output should look like:
9. Online or printed copy of output, or other indications that the output is incomplete:
10. If available, please attach example of good output (before problem occurred).
11. If a report writer problem, please attach a listing of the SMF (system management facilities) records.

Figure 6. Information to Gather before Calling IBM with Output Problems

Procedure

Information to Gather before Calling IBM with Logon Problems

You can use this worksheet to write on directly or as a guide for making your own notes elsewhere.

Note: Before filling out this worksheet, make sure the users are not “revoked”.

1. Level of z/OS: _____ (Example: z/OS Version 1 Release 1)
2. RACF is enabled for sysplex communication: _____
 - non-data sharing mode _____
 - data sharing mode _____
 - read-only mode _____
3. System is configured as an RRSF node: _____
 - local mode _____
 - remote mode _____
4. Installation exits installed (which exits are used and what they do):
5. User modifications, if any (which modules are modified and what the modifications do):
6. **Any** recent changes (such as maintenance applied, RACF options changed, new program products, new hardware):
7. How many users cannot log on? _____
8. Are there any aspects that the users having logon problems share, such as group memberships or authorities?
9. When users attempt to log on, what message, if any, is displayed?
10. If applicable, have SMF records related to the logon problem available.

Figure 7. Information to Gather before Calling IBM with Logon Problems

Information to Gather before Calling IBM with Loop Problems

You can use this worksheet to write on directly or as a guide for making your own notes elsewhere.

1. Level of z/OS: _____ (Example: z/OS Version 1 Release 1)
2. RACF is enabled for sysplex communication: _____
 - non-data sharing mode _____
 - data sharing mode _____
 - read-only mode _____
3. System is configured as an RRSF node: _____
 - local mode _____
 - remote mode _____
4. Installation exits installed (which exits are used and what they do):
5. User modifications, if any (which modules are modified and what the modifications do):
6. **Any** recent changes (such as maintenance applied, RACF options changed, new program products, new hardware):
7. What external symptoms indicate that there is a loop (such as multiple copies of output or poor performance)?
8. Description of routines involved in loop, with addresses of instructions, if available:
9. What conditions the loop occurs in:
10. Whether loop is ___ enabled or ___ disabled.
11. If loop is enabled, please include a standalone system dump.
12. If applicable, please have available online or (preferably) printed output.

Figure 8. Information to Gather before Calling IBM with Loop Problems

Information to Gather before Calling IBM with Message Problems

You can use this worksheet to write on directly or as a guide for making your own notes elsewhere.

1. Level of z/OS: _____ (Example: z/OS Version 1 Release 1)
2. RACF is enabled for sysplex communication: _____
 - non-data sharing mode _____
 - data sharing mode _____
 - read-only mode _____
3. System is configured as an RRSF node: _____
 - local mode _____
 - remote mode _____
4. Installation exits installed (which exits are used and what they do):
5. User modifications, if any (which modules are modified and what the modifications do):
6. **Any** recent changes (such as maintenance applied, RACF options changed, new program products, new hardware):
7. **Complete** message text, including any related messages that immediately precede or follow it:
8. Name of routine running when message is issued:

Figure 9. Information to Gather before Calling IBM with Message Problems

Procedure

Information to Gather before Calling IBM with Performance Problems

You can use this worksheet to write on directly or as a guide for making your own notes elsewhere.

1. Level of z/OS: _____ (Example: z/OS Version 1 Release 1)
2. RACF is enabled for sysplex communication: _____
 - non-data sharing mode _____
 - data sharing mode _____
 - read-only mode _____
3. System is configured as an RRSF node: _____
 - local mode _____
 - remote mode _____
4. Installation exits installed (which exits are used and what they do):
5. User modifications, if any (which modules are modified and what the modifications do):
6. **Any** recent changes (such as maintenance applied, RACF options changed, new program products, new hardware):
7. Description of the conditions in which degradation occurs:
8. Any console messages (please attach).

Figure 10. Information to Gather before Calling IBM with Performance Problems

Information to Gather before Calling IBM with Return Code Problems

You can use this worksheet to write on directly or as a guide for making your own notes elsewhere.

1. Level of z/OS: _____ (Example: z/OS Version 1 Release 1)
2. RACF is enabled for sysplex communication: _____
 - non-data sharing mode _____
 - data sharing mode _____
 - read-only mode _____
3. System is configured as an RRSF node: _____
 - local mode _____
 - remote mode _____
4. Installation exits installed (which exits are used and what they do):
5. User modifications, if any (which modules are modified and what the modifications do):
6. **Any** recent changes (such as maintenance applied, RACF options changed, new program products, new hardware):
7. The return code you expected: _____
The return code you received: _____
8. The RACF macro request that caused the return code (including the parameters passed):
9. The order number (with dash level) and page number or topic number of your copy of the document in which you found the description of the return code:
Order number: _____ Page number or topic number: _____
10. Assembler listing of program.

Figure 11. Information to Gather before Calling IBM with Return Code Problems

Information to Gather before Calling IBM with Wait Problems

You can use this worksheet to write on directly or as a guide for making your own notes elsewhere.

1. Level of z/OS: _____ (Example: z/OS Version 1 Release 1)
2. RACF is enabled for sysplex communication: _____
 - non-data sharing mode _____
 - data sharing mode _____
 - read-only mode _____
3. System is configured as an RRSF node: _____
 - local mode _____
 - remote mode _____
4. Installation exits installed (which exits are used and what they do):
5. User modifications, if any (which modules are modified and what the modifications do):
6. **Any** recent changes (such as maintenance applied, RACF options changed, new program products, new hardware):
7. PSW (program status word): _____
8. Source and assembler listing of routine in which wait occurred, if available.

Figure 12. Information to Gather before Calling IBM with Wait Problems

Chapter 4. Troubleshooting your RACF database

This chapter describes the organization of the RACF database and explains how you can troubleshoot and repair it by using some of the RACF utilities.

You can get a better understanding of the contents of your RACF database by running the database unload utility, IRRDBU00. If you unload your RACF database to a sequential file (using the IRRDBU00 utility), you might uncover problems in your database that you find only when reading the profile. This utility reads every profile.

For more information on using the IRRDBU00 utility, see *z/OS Security Server RACF Macros and Interfaces* and *z/OS Security Server RACF Security Administrator's Guide*.

You might also find it advantageous to use the IRRUT200 RACF database verification utility program to assist in locating problems in your RACF database. For more details, see *z/OS Security Server RACF System Programmer's Guide*.

Format of the RACF database

This section describes the format of the RACF database.

Each RACF database is a non-VSAM single extent data set that is made up of 4KB blocks and must be cataloged.

A RACF database consists of several types of records:

Header block (inventory control block, ICB)

Is the first block in a RACF database and provides a general description of the database.

Templates

Contain mappings of the entity records for the RACF database.

Segment table block

Contains mappings of individual segments from within a template.

BAM (block availability mask) blocks

Determine allocation of space within the RACF database.

Index blocks

Locate entity records (profiles) in the RACF database.

If you are using application identity mapping and it is in stage 1, 2, or 3, there will be an alternative alias index to consider. This alias index correlates an application identity (a set field defined within a non-base segment within the RACF templates, such as the OMVS UID field) to a base profile (the user or group profile which has an application identity field set to a particular value).

Profiles (entity records)

Contain descriptions of the attributes and authorities for every entity defined to RACF. These entities are:

- User profiles
- Group profiles
- DASD data set profiles

Database format

- Profiles for resources defined by entries in the class descriptor table

Figure 13 illustrates the format of the database.

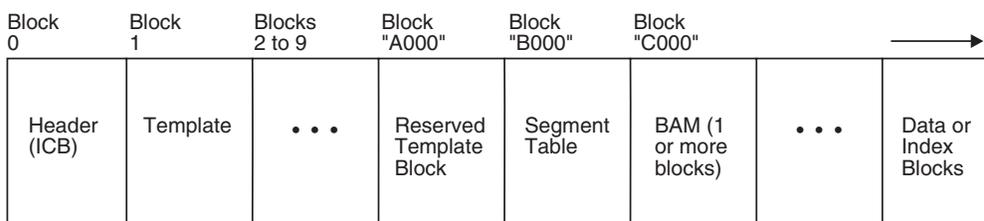


Figure 13. Format of the RACF Database

The first byte in each block is an identifier. Possible values you might use to locate blocks are:

- X'02'—segment table
- X'00'—BAM
- X'83'—data
- X'8A'—index
- X'C3'—empty block

Header block (ICB)

The ICB (inventory control block) has a relative byte address of zero. RACF uses the ICB to locate the other blocks in a RACF database. Each RACF database has an ICB, but RACF uses only the ICB for the master primary data set when determining the setting of options.

See Appendix A, “The Inventory Control Block (ICB)” on page 225 for the fields shown in the data area, ICB.

Templates

IRRTEMP1, which is a member of the partitioned data set SYS1.MODGEN, contains database profile mappings. When your installation creates the database, IRRMIN00 reads the mappings, formats them, and writes them to the RACF database.

RACF provides a template for each type of profile (user, group, data set, and general resource). Each profile consists of a BASE segment, plus other potential segments, for example, the DFP segment. In turn, each template contains a number that corresponds to the type of profile that it is mapping. The template maps the fields that are contained in each segment of the profile by describing the field name and field length.

Attention

Do not modify the template definitions that IBM supplies, or unpredictable results might occur.

Segment table block

The segment table block contains mappings of individual segments from within a template. These describe the segments associated with the profiles.

BAM blocks

A block availability mask (BAM) block is a 4KB block that describes the availability of the corresponding blocks in a RACF database. Each BAM block starts with a header followed by a table of two-byte “block masks”.

The BAM high-water mark contained in the ICB is the address of the BAM block from which segments were last allocated or deallocated. This BAM block is used first when starting a search for space for a new allocation.

BAM block header

The BAM block header contains the following information:

Bytes Description

Bytes 0-5:

Relative byte address (RBA) of the previous BAM block (or 0 if this is the first block).

Bytes 6-11:

RBA of the next BAM block (or 0 if this is the last block).

Bytes 12-17:

RBA of the first 4KB block whose space this BAM block defines.

Bytes 18-19:

Number of 4KB blocks whose space this BAM block defines. This is also the number of two-byte block masks which follow. A BAM block can correspond to a maximum of 2038 blocks of 4096 bytes each.

BAM block masks

Following the BAM block header is a table of block masks. A block mask is a two-byte field (16 bits) that corresponds to one 4KB block in the RACF database. The first block mask corresponds to the block whose RBA is defined in Bytes 12-17 of the BAM header. Subsequent block masks in the BAM correspond successively to the 4KB blocks following this RBA. Bytes 18-19 of the BAM header contains the number of block masks in this BAM.

Each bit in the block mask corresponds, successively, to a 256-byte slot within the mask's corresponding 4KB block. If a bit is set to 1, its corresponding slot in the block is free. Otherwise, this slot is in use. Figure 14 on page 108 is an example of a block mask for a block whose first six slots are in use.

Database format

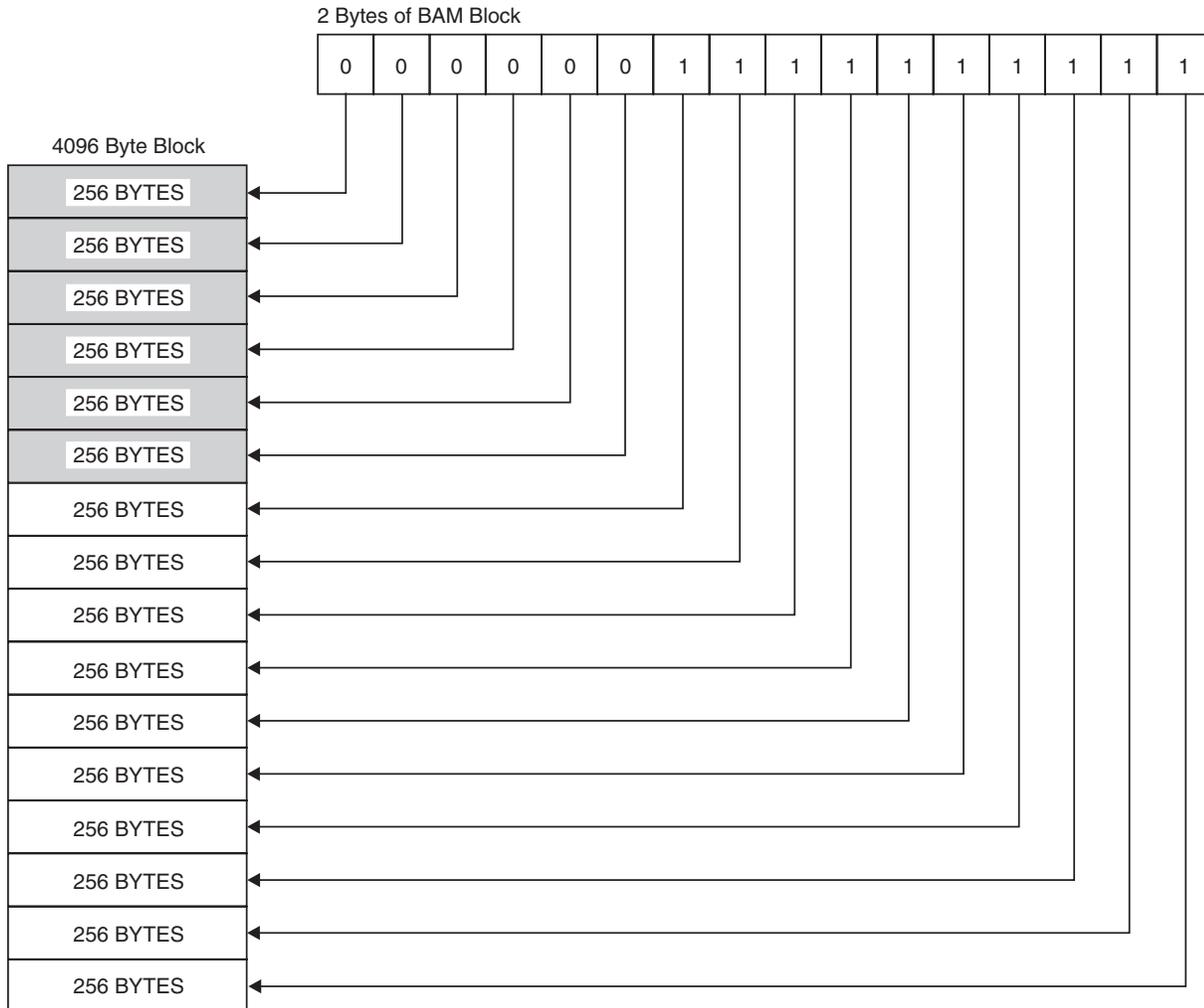


Figure 14. Block Masks of the RACF Database

Index blocks

RACF uses a multilevel index set to locate profiles. There can be up to 10 levels on a RACF database. All index searches begin with the highest level index block, whose RBA (relative byte address) is contained in the ICB (inventory control block). At every level but the lowest, the first entry in a block that is equal to or alphabetically greater than the requested profile name is used to reach the next lower-level index block. If no entry is greater than or equal to the profile name, the index search continues with the RBA pointed to by the last index entry in the block being searched. This situation can occur because of previous index-entry deletions.

The lowest level of index blocks (level 1) is known as the sequence set. Index entries in the sequence set contain the RBAs of the actual profile segments. Each block then points to the next block in succession.

Note: The pointer in the ICB that is pointing to the first block in the sequence set is for use by BLKUPD if the database index structure is corrupted. The sequence set pointer is also used by IRRUT400 when reorganizing the database.

Figure 15 is an example of part of a RACF index, and it illustrates the path RACF uses to find the profile named FAL.N. This example assumes 3 levels. The level-1 blocks for the first and third level-2 blocks are partially shown in the figure.

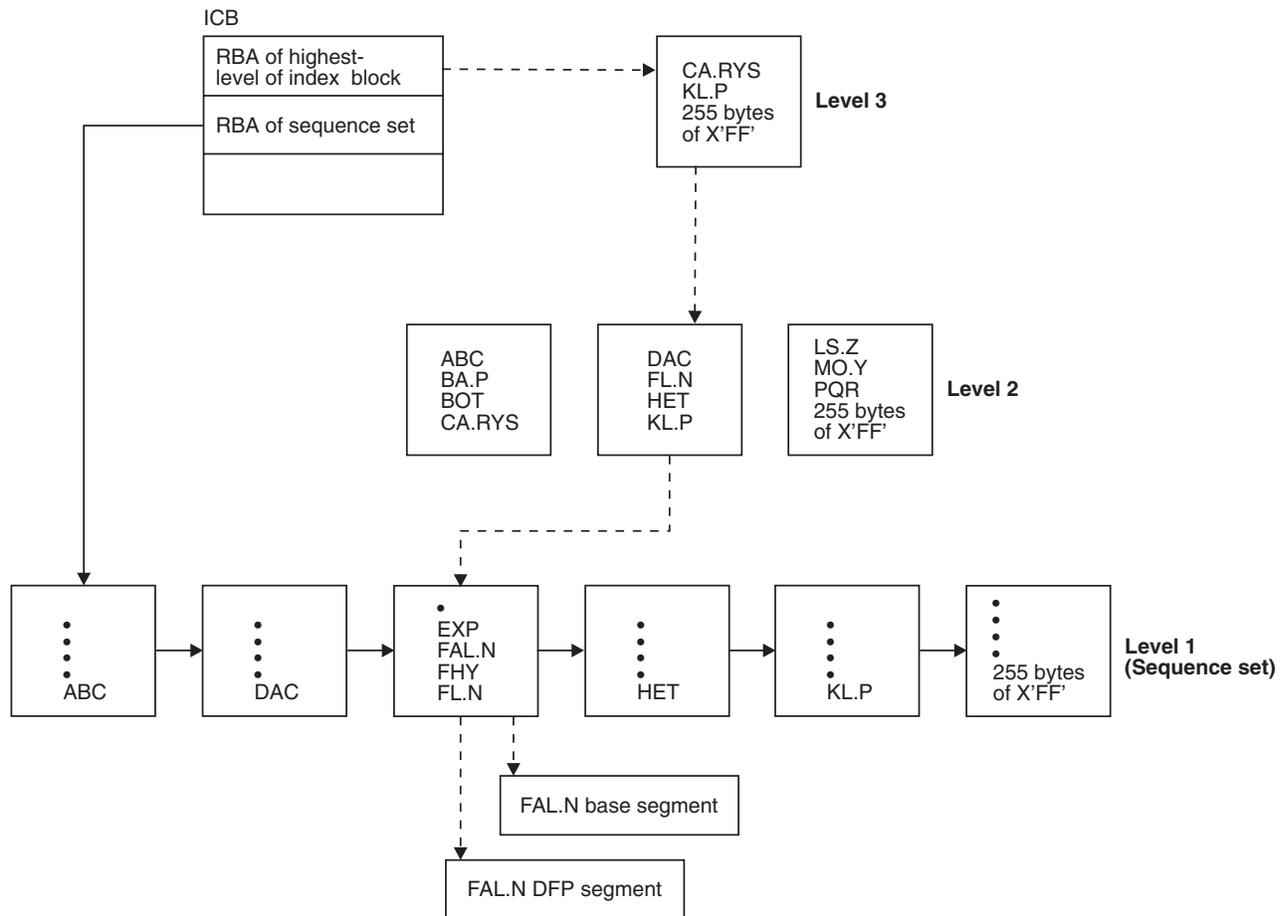


Figure 15. Example of a RACF Index

Alias index blocks

A companion to the existing index structure is the alias index structure. For alias indices, there are four notable differences to consider:

- There are alternate anchors in the ICB
- There is a new format identifier
- There is a new index entry identifier
- The index entries in the sequence set of the alias index contain a base profile data area that names the base profile that corresponds to the particular alias index.

Overview

An index block (regular or alias) is a 4KB block whose overview is composed of the following parts:

- Header
- Table of index entries.
- Sequence set chain pointer entry. For level-1 index blocks only. Follows last index entry.

Database format

- X'0C' Delimiter
- (At end of block) Table of two-byte offsets to the index entries.

Figure 16 is an example of an overview of a level-1 index block. The first 14 bytes is the header. In this example, n (in the header) is the number of index entries. Offset X'0EF8' is the sequence set chain pointer entry (which follows the last index entry). This offset value is also found in the header.

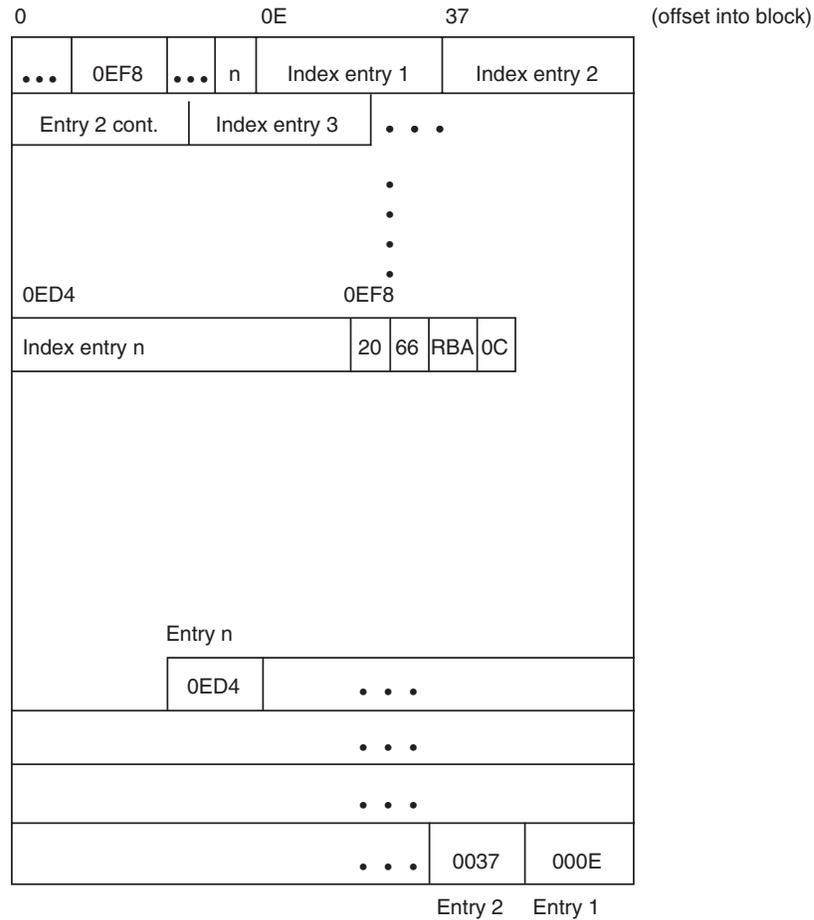


Figure 16. Example Overview of a Level-1 Index Block

Index block header

The format of an index block header in the index block is as follows:

Bytes Description

Byte 0:

X'8A' Index block identifier

Bytes 1-2:

X'1000' Length of the index block

Byte 3:

X'4E' Index block identifier

Byte 4:

X'00' Format identifier for regular index block; X'01' Format identifier for alias index block

Byte 5:
Index-level number (01-0A)

Bytes 6-7:
Offset to the last entry in the index block. In a level-1 index block, the last entry is a sequence set chain pointer entry. In an upper-level index block, the last entry is the last index entry of the block.

Bytes 8-9:
Offset to free space in the index block

Bytes 10-11:
Offset to a table of index-entry offsets

Bytes 12-13:
Count of index entries in the block. This is also equivalent to the count of entries in the table of index-entry offsets (the bottom part of the block).

Figure 17 shows an example of the index block header set up for the example of the level-1 index block in Figure 16 on page 110.

0	1	3	4	5	6	8	A	C	E	(offset)
8A	1000	4E	00	01	0EF8	0F01	0F9E	<i>n</i>		First index entry...

Figure 17. Example of an Index Block Header

Index entries

Following the index block header is a table of index entries. The format of an index entry is as follows:

Bytes Description

- Byte 0:**
Entry identifier, as follows:
- X'21'** Normal index entry (non-duplicate entry). In a set of duplicate index entries, this identifier marks the last index entry of the set.
 - X'22'** Duplicate index entry. This entry is a duplicate of the next index entry. Index entries can be duplicates of one another until one marked by the X'21' identifier is reached.

A duplicate index entry can exist only in a level-1 index block and only for data set profiles with the same name.
 - X'23'** Alias index entry.

Database format

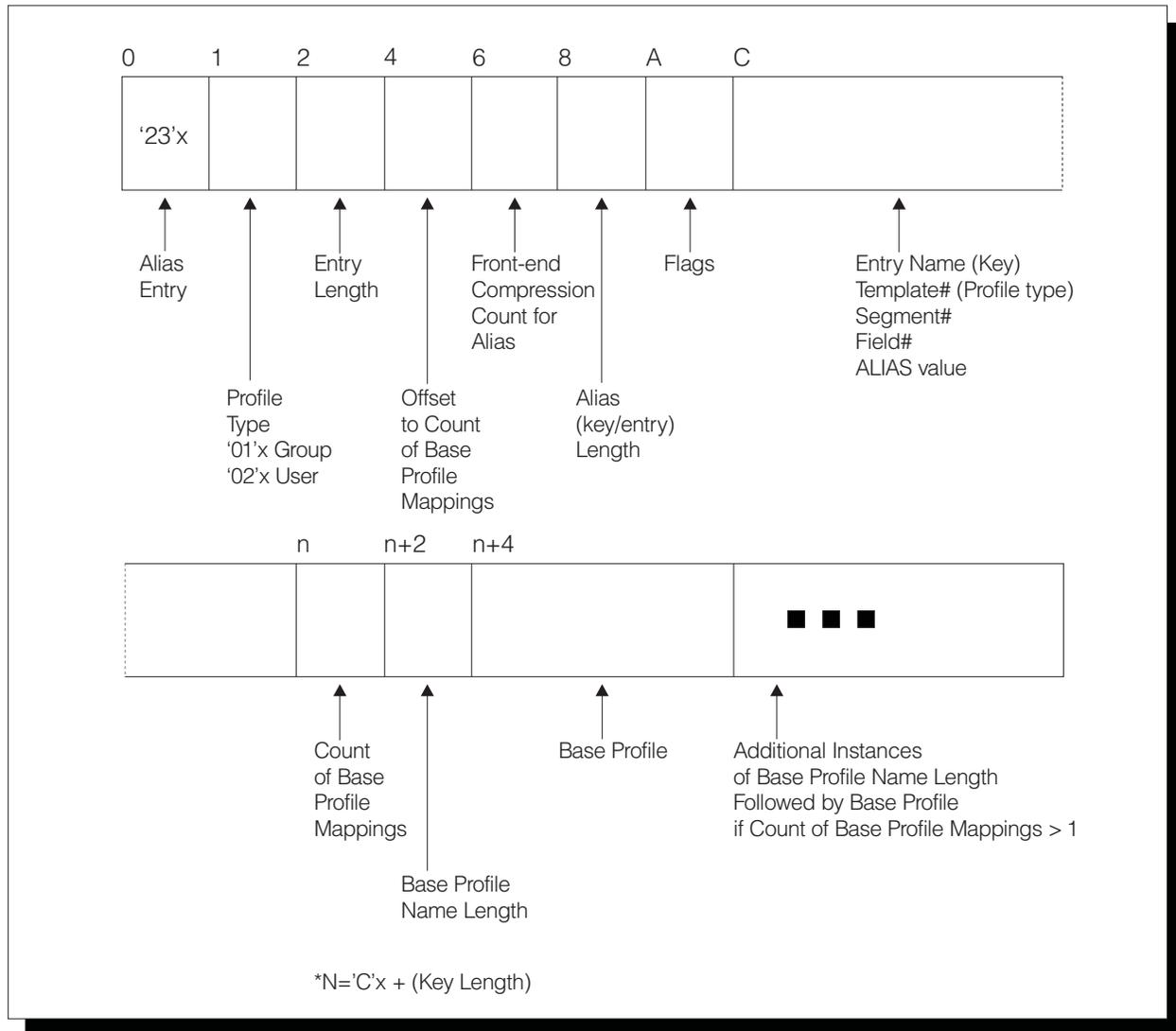


Figure 18. Example Overview of an Alias Index Block

Byte 1:

Type of profile for this index entry, as follows:

- X'01'** Group
- X'02'** User
- X'04'** Data set
- X'05'** General resource

Bytes 2-3:

Length of this index entry

Bytes 4-5:

Offset from the beginning of the entry to the segment data area for regular index entries, and offset from the beginning of the entry to the base profile data area for alias index.

Bytes 6-7:

Front-end compression count. Number of leftmost characters that had been suppressed from the profile name in the index entry's name field. To save space in the database, RACF suppresses the leftmost characters that are identical to those in the preceding index entry.

To find the suppressed characters, trace the index entries backward to the one with front-end compression count of zero. In this index entry, all leftmost characters would still be intact in its name field.

The first index entry of the index block always has a front-end compression count of zero. A name that is exactly the same as one in the previous entry might be totally compressed.

Figure 19 shows an example of front-end compression counts.

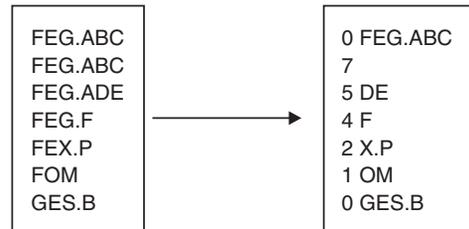


Figure 19. Example of Front-End Compression in an Index Block

Note: Not all entry names are necessarily compressed at all times. For example, when a new name is added, it might not be compressed until the database is reformatted (such as through the IRRUT400 utility).

Bytes 8-9:

Length of index entry name

Bytes 10-11:

Reserved

Bytes 12-*n*:

Index entry name, 0-255 bytes. Bytes 8-9 contain the actual length.

An index entry name corresponds to either a profile name or application identity, but it does not always match letter by letter or byte by byte. It might have been compressed (see Bytes 6-7, for example), or some of its characters might have been substituted by RACF for internal purposes (such as to save space or to facilitate the search).

For an alias index entry, the first 3 bytes of the entry name are non-EBCDIC and specifies the particular alias field within the template as follows:

- **Byte 0:** Template identifier. Describes the type of base profile associated with this alias entry.
- **Byte 1:** Segment identifier. See Table 18.
- **Byte 2:** Field identifier. See the template descriptions in z/OS SecureWay Security Server RACF Macros and Interfaces for field identifiers.

In an upper-level (that is, not level 1) index block, the index entry name might correspond to the entry name of the last index entry of the next-lower level block. Its rightmost characters might have been compressed if RACF determines that they are not essential to finding the correct index block at the next-lower block.

An index entry name of 255 bytes of X'FF' signifies the end of index blocks for that level number.

Database format

Bytes $n+1$:

Segment data area. In an upper-level regular or alias index block, the segment data area has the following format:

Byte 0:

X'62' Identifier byte

Bytes 1-6:

RBA of the next-lower-level index block

In a regular level-1 index block, the segment data area has the following format:

Byte 0:

Number of segment-data fields in this data area. This is also the number of segments in this profile.

Bytes 1-7:

Segment-data field. This field is repeated successively for each segment in the profile. The format of a segment-data field is:

Byte 0:

Segment Identifier. See Table 18 on page 115 for a list of identifiers. Profile type is indicated in Byte 1 of the index entry.

Bytes 1-6:

RBA of the segment.

In an alias level-1 index block, the segment data area has the following format:

Bytes 0-1:

Number of base profile fields in this data area.

Bytes 2- n :

Base profile data field. This field is repeated successively for each base profile reference for this application identity.

Bytes 2-3

Denotes the 1-8 character length of the user or group profile name immediately following this field.

Bytes 4- m :

Base profile name.

Table 18. Segment Identifiers

Group	User	Data Set	General
X'01'—BASE	X'01'—BASE	X'01'—BASE	X'01'—BASE
X'02'—DFP	X'02'—DFP	X'02'—DFP	X'02'—SESSION
X'03'—OMVS	X'03'—TSO	X'03'—TME	X'03'—DLFDATA
X'04'—OVM	X'04'—CICS		X'04'—SSIGNON
X'05'—TME	X'05'—LANGUAGE		X'05'—STDATA
	X'06'—OPERPARM		X'06'—SVFMR
	X'07'—WORKATTR		X'07'—CERTDATA
	X'08'—OMVS		X'08'—TME
	X'09'—NETVIEW		
	X'0A'—DCE		
	X'0B'—OVM		
	X'0C'—LNOTES		
	X'0D'—NDS		

Figure 20 shows an example of a normal index entry in a level-1 index block for a user profile named `USR26`, which contains three segments: Base, TSO, and DFP.

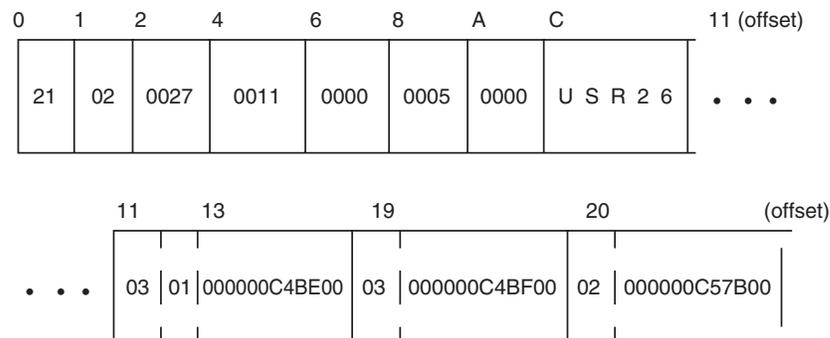


Figure 20. Example of Index Entry for `USR26` with a Base, TSO, and DFP Segment

Sequence set chain pointer entry

A sequence set chain pointer entry is an entry that references to the next level-1 index block. This entry follows the last index entry of the index block and is applicable only in level-1 index blocks. It has the following format:

Bytes Description

Bytes 0-1:

X'2066' Sequence Set Chain Pointer Entry Identifier

Bytes 2-7:

RBA of next level-1 index block (0 if last one of the set)

An example of a sequence set chain pointer entry is illustrated in Figure 16 on page 110.

Database format

X'0C' delimiter

A 1-byte X'0C' delimiter marks the end of the list of entries in an index block. In an upper-level index block, it follows the last index entry. In a level-1 index block, it follows the sequence set chain pointer entry.

The X'0C' delimiter is then followed by a series of zeros until the beginning of the table of index-entry offsets at the end of the block.

Index-Entry offset table

At the end of an index block is a table of two-byte offsets to the index entries. This table starts from the bottom of the block and grows inward so that the last offset of the table is the offset for index entry 1, the next-to-last offset of the table is for index entry 2, and so on. RACF uses this table to perform a search on index entries.

In the example in Figure 16 on page 110, note that the last offset of the table is the offset of the first index entry and the first one of the table is the offset of the last index entry.

Profiles

The profiles, or entity records, contain the actual descriptions of the attributes and authorities for every entity (users, groups, DASD data sets, and resource classes defined in the class descriptor table) defined to RACF. The number in the entry-type field identifies the type of profile and corresponds to the number of the template that maps this type of profile.

The record data (including the type of profile that it is) follows the header. This data consists of the fields that are mapped by a template. See the template description corresponding to each type of profile for the contents of these fields. The template descriptions are in *z/OS Security Server RACF Macros and Interfaces*.

Because there can be duplicate entry names in different classes, the RACF manager adds a class identifier to the beginnings of general-resource entry names (for example; DASDVOL -, TAPEVOL -, or TERMINAL- for DASD volumes, tape volumes, or terminals, respectively). General-resource class names that are not eight characters in length are padded with trailing blanks.

Note: If you define a profile and use generic characters such as (*) to add members to the profile, RLIST RESGROUP does not return any of the matching profiles in its output because it does not support generic matches.

Generic profile names have the first period in a DATASET profile replaced by X'01', and the dash in the class identifier for general-resource classes replaced by X'02'. Although these expanded names are transparent to the user, they appear when using the block update utility command or the IRRUT200 utility. You also need to be aware of them when constructing a database range table.

When a tape volume profile is initially created, RACF places the tape volume serial in the volume list of the profile. RACF creates an index entry and profile name in the standard way. If another tape volume is to be added (creating a volume set), RACF adds its volume serial to the volume list in the profile and creates an index entry for the volume that points to the profile.

For example, if there are six tape volumes in a tape volume set, there are six index entries pointing to the same profile and six volume serials in the profile's volume list. When a tape volume is deleted, RACF removes the volume serial from the

volume list in the profile and deletes the index entry. The profile name does not change, even if the volume after which the profile might have been named is deleted.

It is possible to have a profile name of TAPEVOL -TAPE01 without having a corresponding index entry and without having TAPE01 in the volume serial list.

The database profiles consist of segments that are made up of fields and repeat groups that follow a record header. The record header, the field structure, and the repeat group structure are described on the pages that follow.

• **Record header**

The record header consists of the following fields:

Bytes	Description
Byte 0:	X'83' Record identifier.
Bytes 1-4:	Physical length of this record, in bytes.
Bytes 5-8:	Logical record length. Length, in bytes, of the portion of the record that actually contains data.
Bytes 9-16:	Segment name.
Bytes 17-18:	Length of profile name (in Byte 20).
Byte 19:	Reserved
Bytes 20+n:	Profile name. Its length is specified in Bytes 17-18.

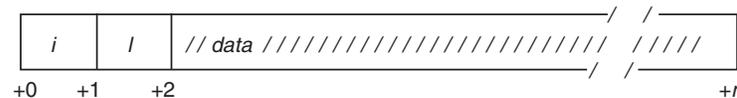
• **Field structure**

Following the record header is a set of one or more segment data fields. Although the potential total length of these fields is 2GB, that might be limited by the type of DASD and the amount of virtual storage available to the user.

All data fields are in a variable-length format. The first byte is the field ID. See the template descriptions in *z/OS Security Server RACF Macros and Interfaces* for field identifiers. Where indicated in the template descriptions, the field can be a member of a repeat group.

If the field is not a member of a repeat group, the field ID is followed by a field indicating the length of the data that follows. If the high-order bit of the length field is zero, this field is one byte and the data can be up to 127 bytes; if the high-order is set, the length field is 4 bytes (for example, X'80000022'), and the data can be up to 2 to the 31st power.

The following figure shows the structure of a profile field when the length field is one byte. The structure is:

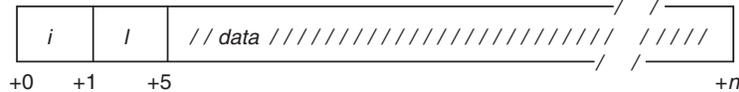


where:

- *i* is the field ID. *i* is 1 byte.
- *l* is the length of the data that follows. *l* is 1 byte.
- The high-order bit of this field is zero.
- *data* is 1 to 127 bytes of data.

Database format

The following figure shows the structure of a profile field when the length field is 4 bytes. The structure is:



where:

- i is the field ID. i is 1 byte.
- l is the length of the data that follows. l is 4 bytes.
- The high-order bit of this field is set to one.
- $data$ is up to 2^{31} bytes of data.

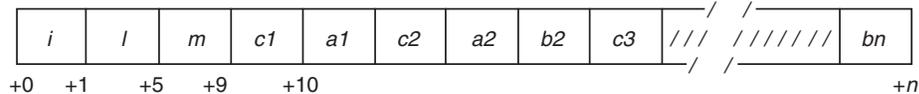
• Repeat group structure

A repeat group structure contains a set of fields that are part of a repeat group. It contains all occurrences of a repeat group and, for each occurrence, it contains the count of fields and every field in the occurrence, *including those with null values*.

The field ID (first byte) is associated with the entire repeat group. Fields in a repeat group structure do not have individual ID fields.

Each repeat group is limited to 64KB of installation data.

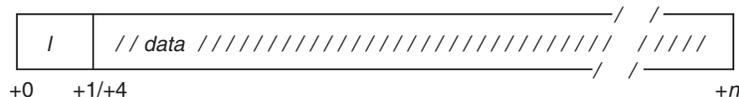
The structure of a repeat group is:



where:

- i is the field ID. i is 1 byte.
- l is the length of the entire repeat group. l is 4 bytes.
- m is the count of repeat group occurrences. m is 4 bytes.
- $c1$, $c2$, and $c3$ are counts of fields in each occurrence. Each is 1 byte.
- $a1$, $a2$, and $b2$ are data, up to 2^{31} bytes each.

Each data field has the following format:



where:

- l is the length of data that follows. If its high-order bit is zero, l is one byte and the data length can be up to 127 bytes. If its high-order bit is set to one, l is 4 bytes.
- $data$ is up to 2^{31} bytes of data.

When displaying a profile with the BLKUPD command, you might want to have the RACF database templates available for reference. These can be found in *z/OS Security Server RACF Macros and Interfaces*. They include a list of the field IDs in numeric order. The field IDs are in decimal in *z/OS Security Server RACF Macros and Interfaces* but in hexadecimal when displayed by the BLKUPD command.

Example of a profile: Figure 21 shows a profile and identifies the record header, the first profile field structure, and the first repeat group structure. The field IDs of the other fields are shaded. You can use BLKUPD to display a profile. See “Block Update command for a RACF database (BLKUPD)” on page 120.

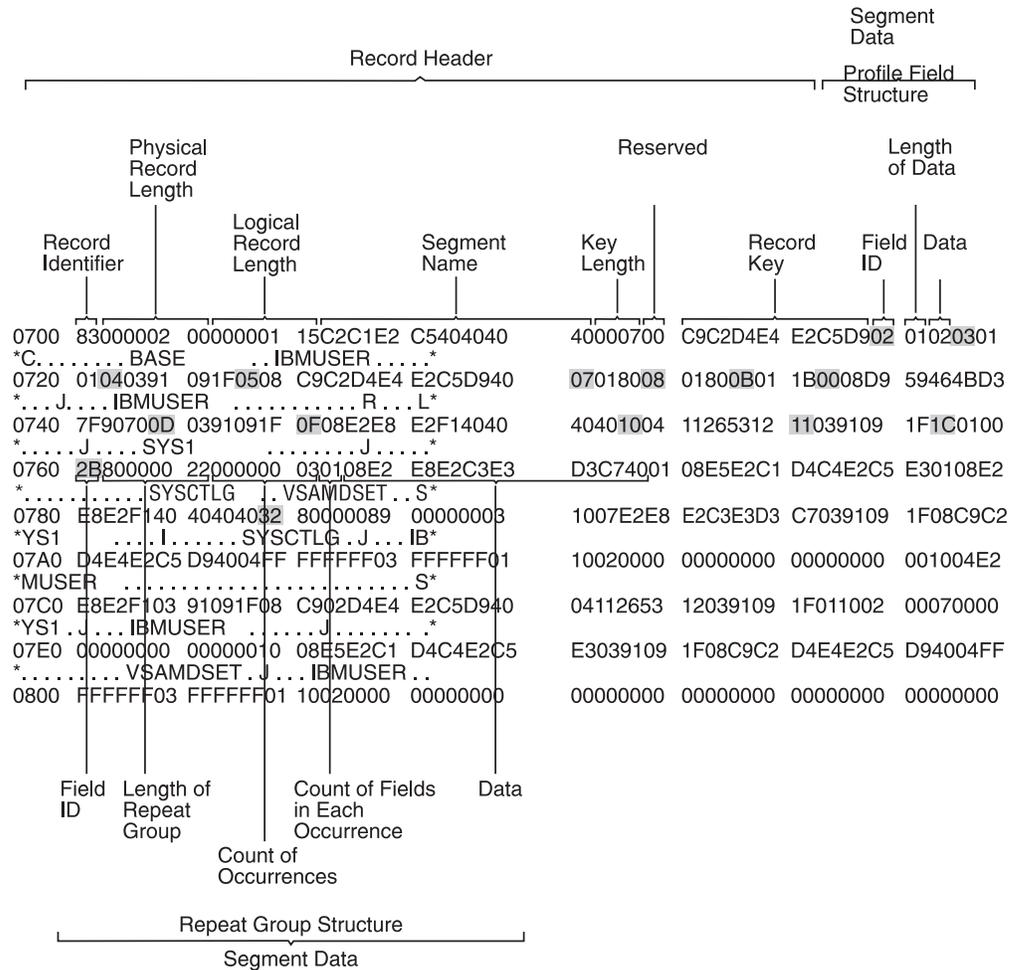


Figure 21. Example of a Profile Displayed by BLKUPD

Database Unload Utility for a RACF Database (IRRDBU00)

If you plan to use the block update (BLKUPD) command to update your database, you might want to get a better understanding of what your current database looks like.

The database unload utility (IRRDBU00) reads every profile as it unloads your RACF database to a sequential file. This can uncover problems in your database that you find only when reading the profile.

Database format

For more information on using the utility, see *z/OS Security Server RACF Macros and Interfaces* and *z/OS Security Server RACF Security Administrator's Guide*.

Block Update command for a RACF database (BLKUPD)

You can use BLKUPD to examine or modify any block in a RACF database: a data block, index block, BAM block, or unallocated block.

In order to use BLKUPD you must have at least UPDATE authority to the RACF database.

Attention

Before using the BLKUPD command, you should be very familiar with the RACF database and its configuration, because using BLKUPD improperly can damage the RACF database. (See “Format of the RACF database” on page 105.)

Before entering the BLKUPD command, you should read and understand the pages on the format of the database. Then, before using the BLKUPD command to perform updates to your RACF database, try to use one of the other RACF commands to alter or delete the entry in question.

This section describes the following topics:

- Considerations when using the BLKUPD command
- Hierarchy and uses of the BLKUPD command
- Examples

Considerations for using BLKUPD

The following considerations apply to using the block update command (BLKUPD):

- In general:
 - Do not use BLKUPD during hours of peak activity on the active RACF database because the command uses hardware RESERVES or enqueues (GRS ENQs) to serialize access to the database.
 - BLKUPD can only be issued as a TSO command.
 - BLKUPD cannot be directed to run on another system using the AT or ONLYAT keywords or automatic command direction.
 - Whenever you need to run BLKUPD against a database that is active on a system that is a member of the RACF sysplex data sharing group, always run the utility from a system in the group. If you do not, you might damage your RACF database, or receive unpredictable results from the utility.
- Before using BLKUPD:
 - Try to correct the error by using other RACF commands.
 - Make a copy of the RACF database. Use BLKUPD on the copy. IBM might be able to use the copy for further diagnosis.
 - Run IRRUT200. The output might be useful in identifying the damaged portion of the database.
- Document all changes made for future reference and diagnosis.
- RVARY the “repaired” database online and test your fix.
- After the fix has been verified, apply the fix to the “real” database and RVARY this database ONLINE.

Database format

- If a profile is in question, delete the index entry that points to the profile, rather than trying to repair the profile itself. Use a RACF command to add the profile and index entry.
- Do not use BLKUPD to modify the BAM blocks. Instead, run the IRRUT400 utility, which rebuilds the BAM blocks.
- If a RACF database is RACF-protected, you must have at least UPDATE authority to the database.
- When executing BLKUPD under control of command procedures, you must add the DATA and ENDDATA command procedure statements around each BLKUPD command and subcommand that is also a command procedure statement. See *z/OS TSO/E Command Reference* for a description of command procedures.
- When executing BLKUPD under a TMP (terminal monitor program) that allows multitasking, you cannot have any other active task in your session. Allow the BLKUPD command to complete before executing any other TSO command.
- BLKUPD does not support attention handling.
If an attention interrupt occurs and the user does not enter any data other than a null line or TIME command, the RACF database remains enqueued.
- The subcommands of BLKUPD follow the TSO syntax rules. See *z/OS TSO/E Command Reference* for a description of TSO command syntax rules.
- BLKUPD runs as an APF-authorized TSO command.
- TSO prompt must be set on.
- When RACF is enabled for sysplex communication, you cannot use BLKUPD to update the database if your system is operating in read-only mode.

If you need assistance in using BLKUPD, contact the IBM support center.

Hierarchy of the BLKUPD command

Figure 22 shows the relationship between the BLKUPD command and its levels of subcommands.

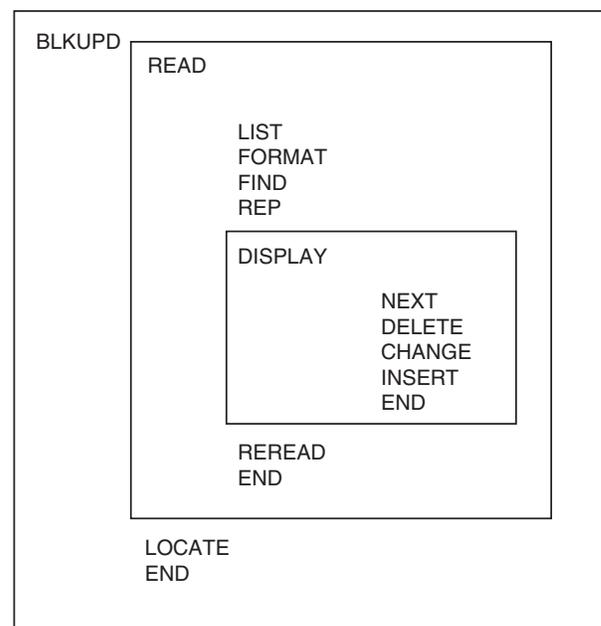


Figure 22. The Relationship between the BLKUPD Command and Its Levels of Subcommands

Database format

Using the BLKUPD command

Use the BLKUPD command to access the RACF database. Do *not* use BLKUPD during hours of peak activity on the active RACF database because the command uses hardware RESERVES or enqueues (GRS ENQs) to serialize access to the database.

The Syntax of the BLKUPD command

```
BLKUPD [racfbname]
```

where *racfbname* specifies the name of a data set in the RACF database. The name can be from 1 to 44 characters.

If the name is not specified, the RACF database must be allocated to the TSO session with the SYSRACF file name.

Working with the RACF database: To update or examine a data set in the RACF database, perform the following steps:

1. Decide which data set in the RACF database you want to work with, and enter BLKUPD.

Note: After entering the BLKUPD command, you can use the following subcommands: LOCATE, READ, or END.

2. Decide which block on the database you want to work with. If needed, use the LOCATE subcommand to assist you in finding the specific block.
3. Enter the READ subcommand, specifying either UPDATE or NOUPDATE.
4. Enter the subcommands of READ necessary to accomplish your task.
5. Issue the END command to end the utility.

The LOCATE subcommand: Use the LOCATE subcommand when you do not know the relative byte address (RBA) of the block you want to address. This subcommand locates an index entry in the sequence set and displays a formatted list of the contents of the level-1 index block containing the entry name. Optionally, the LOCATE subcommand displays a listing of all the index blocks in the chain from the highest-level index block to the appropriate level-1 block.

The syntax of the LOCATE subcommand (of BLKUPD)

```
LOCATE ENTRY(entryname)  
        CLASS(classname)  
        [GENERIC]  
        [LISTALL]
```

where:

ENTRY(*entryname*)

specifies the index entry to be located; *entryname* can be from 1 to 255 characters, which can be enclosed in quotation marks or not, and can contain hexadecimal data. For example:

```
ENTRY('X' C2' MUSER)
```

is equivalent to:

```
ENTRY(IBMUSER)
```

To specify a mixed-case entry name, you must enclose *entryname* in quotes. If you do not enclose *entryname* in quotes, alphabetic characters in *entryname* are treated as uppercase characters, regardless of the case in which you enter them. For example, if you enter:

```
LOCATE ENTRY(irrsitec) CLASS(USER)
```

RACF looks for the index entry IRRSITEC, but if you enter:

```
LOCATE ENTRY('irrsitec') CLASS(USER)
```

RACF looks for the index entry irrsitec.

CLASS(classname)

is one of the following:

- GROUP
- USER
- DATASET
- The class name of the general resource

GENERIC

specifies that *entryname* is generic.

LISTALL

specifies that all the index blocks in the hierarchy chain are to be displayed.

The formatted list contains the same information as that produced by the FORMAT subcommand of READ (see “The FORMAT subcommand” on page 126).

If an index block in the chain contains an error, BLKUPD produces a hexadecimal dump of the block. If the name is not found in a level-1 block, BLKUPD displays the block that should contain it.

If the block containing the name is not found by a hierarchy index search because of errors in the chain, BLKUPD searches the sequence set.

The READ subcommand: The READ subcommand reads the block specified by the RBA (relative block address) into storage and copies it into a work area.

This subcommand allows you to examine or change the database.

Note that it is recommend that customers avoid using the class name ALIAS in the class descriptor table since it violates the class name guidelines documented for customer classes. BLKUPD will use existing error messages for alias index processing.

For more information on the alias indices, see “Alias index blocks” on page 109.

The syntax of the READ subcommand (of BLKUPD)

```
READ rba [UPDATE]
        [NOUPDATE]
```

where:

rba

specifies the relative byte address of the block to be read.

Database format

If the RBA does not represent an address on a 4KB boundary, the block on the 4KB boundary that contains the RBA is read. You can enter the RBA value as a hexadecimal (X'nn') or decimal (nnn) number. Hexadecimal numbers can be from 1 to 8 characters; decimal numbers can be from 1 to 10 characters.

UPDATE

specifies you are planning to update one of the blocks in the RACF database.

Specifying the UPDATE keyword imposes an exclusive RESERVE on the database, meaning the issuing system has exclusive control of the RACF database and only that system can update it. Any system that shares the database cannot read the database or update it. In addition, no other user on the issuing system can read or update the database.

If RACF is enabled for sysplex communication:

1. You cannot update the RACF database when you are operating in read-only mode.
2. When running in data sharing mode, RACF uses global resource serialization (ENQ/DEQ), rather than hardware RESERVEs.

NOUPDATE

specifies you are examining one of the blocks in the RACF database.

Specifying the NOUPDATE keyword imposes a shared RESERVE on the RACF database, meaning that if you are sharing the RACF database with another system, both systems can read the database, but neither system can update it.

The NOUPDATE keyword on the READ command permits you to examine the database block without making any changes. NOUPDATE is the default. Should you make changes and then end BLKUPD, the changes are not recorded.

If RACF is enabled for sysplex communication and running in data sharing mode, RACF uses global resource serialization (ENQ/DEQ) rather than hardware RESERVEs.

Using the subcommands of READ: The UPDATE keyword on the READ subcommand allows you to use the subcommands to update the block. The subcommands are explained in detail in the pages that follow. The subcommands are:

- **LIST**—displays portions of the block in hexadecimal.
- **FORMAT**—produces a formatted listing of the contents of an index block.
- **FIND**—locates the offset of data in the block.
- **REP**—replaces data in the block (valid only with the UPDATE command).
- **DISPLAY**—displays the entries of an index block one at a time (it has several subcommands associated with it).
- **REREAD**—overlays the new block in the work area with the old block (valid only with the UPDATE keyword).
- **END**—terminates the READ function.

The FIND subcommand: The FIND subcommand finds the hexadecimal offset of a string in the block.

Syntax of the FIND subcommand of READ

```
FIND string [OLD]
           [NEW]
```

where:

string

specifies the string that is to be located.

The string can be hexadecimal (which is specified as *X'string'*) or characters (which can be enclosed in quotation marks or not). Hexadecimal strings are right-justified and padded with zeros to a byte boundary. Character strings are left justified and padded with zeros to a byte boundary.

If *string* contains lowercase characters, *string* must be enclosed in quotation marks. If *string* is not enclosed in quotation marks, all characters are treated as uppercase characters, regardless of the case in which you enter them.

OLD

specifies the original block obtained by the READ command. OLD is the default.

NEW

specifies the copy of the block. **NEW is valid only with the READ UPDATE function.**

After entering the FIND subcommand, enter the LIST subcommand to see the actual data.

The LIST subcommand: The LIST subcommand displays a hexadecimal dump of all or part of the RACF block. It allows you to see exactly what is inside the block and where it is located.

Syntax of the LIST Subcommand of READ

```
LIST [NEW|OLD]
      RANGE(xxx,yyy)
      ALL
```

where:

NEW

specifies the copy of the original block (it might or might not have been updated). **NEW is valid only with the READ UPDATE function.**

OLD

specifies the original block that was copied into storage when you entered the READ command. OLD is the default.

RANGE

defines the parts of the block to be listed.

- *xxx* specifies the offset into the block where the listing is to start. The default is 0.
- *yyy* specifies the number of bytes to be listed. The default is 16.

The values for *xxx* and *yyy* can be hexadecimal or decimal numbers. If the sum of *xxx* and *yyy* exceeds 4096, the dump ends at the end of the block.

ALL

specifies a hexadecimal listing of the entire RACF block.

Database format

The *FORMAT* subcommand: The *FORMAT* subcommand displays a formatted list of the contents of an index block. Use the *FORMAT* subcommand if you have read an index block and need to see the all the entries in this block and their RBAs (relative block addresses).

The list contains the following information:

- The RBA of the block
- The level of the block
- The offset to the last entry
- The offset to free space
- The offset of each entry within the block
- The front-end compression count of each entry
- The name of each entry (generic names are identified by a G in parentheses after the name)
- The last qualifier encode byte of each entry
- The RBA of the next-level index block for each entry or, for level-1 blocks, the RBA of the profile

If the block obtained by the *READ* command is not a valid index block, the request is rejected.

Syntax of the *FORMAT* subcommand of *READ*

```
FORMAT [OLD|NEW]
```

where:

OLD

specifies the original index block obtained by the *READ* command. **OLD** is the default.

NEW

specifies the index block that was updated. **NEW is valid only with the *READ UPDATE* function.**

The *REP* subcommand: The *REP* subcommand replaces a string in the new block with another string. Optionally, this subcommand verifies the original string before making the replacement. **This subcommand is valid only with the *READ UPDATE* function.**

Syntax of the *REP* subcommand of *READ UPDATE*

```
REP new-string  
  OFFSET(xxx)  
  [VER(old-string)]
```

where:

new-string

specifies the new string of data.

The data can be hexadecimal (which is specified as *X'string'*) or characters (which can be enclosed in quotation marks or not). Hexadecimal strings are

right-justified and padded with zeros to a byte boundary. Character strings are left-justified and padded with zeros to a byte boundary.

If *new-string* contains lowercase characters, *new-string* must be enclosed in quotation marks. If *new-string* is not enclosed in quotation marks, all characters are treated as uppercase characters, regardless of the case in which you enter them.

OFFSET(*xxx*)

specifies the offset into the block where the string is to be replaced.

VER(*old-string*)

specifies the original string that is to be verified. If the string is not found at offset *xxx* into the new block, the replacement is not made.

If *old-string* contains lowercase characters, *old-string* must be enclosed in quotation marks. If you do not enclose *old-string* in quotation marks, all characters are treated as uppercase characters, regardless of the case in which you enter them.

Note: The verify (VER) operand only verifies the characters specified; it does not verify the whole string. Be sure to enter the entire string you want verified.

The DISPLAY subcommand: The DISPLAY subcommand displays an entry of the index block that was read by the READ command.

When you enter the DISPLAY subcommand (after specifying READ UPDATE), the BLKUPD command copies the original block to a new block in storage. This copy is referred to as a **new** index block. You can then use the DELETE, CHANGE, and INSERT subcommands of the DISPLAY subcommand to modify the displayed entries.

If the block obtained by the READ command is not a valid index block, RACF rejects your DISPLAY request.

Syntax of the DISPLAY subcommand of READ

```
DISPLAY [ENTRY(entryname) CLASS(classname)]
        [GENERIC]
```

where:

ENTRY(*entryname*)

specifies the index entry where the display begins. If you do not specify an entry name, the display begins at the first entry in the index block; the entry name can be from 1 to 255 alphanumeric characters, which can be enclosed in quotation marks or not, and can contain hexadecimal data.

To specify a mixed-case entry name, you must enclose *entryname* in quotes. If you do not enclose *entryname* in quotes, alphabetic characters in *entryname* are treated as uppercase characters, regardless of the case in which you enter them.

If you specify an entry name, you must specify a class name.

CLASS(*classname*)

must be one of the following:

- GROUP

Database format

- USER
- DATASET
- The class name of the general resource

GENERIC

indicates that the index specified in ENTRY(*entryname*) is a generic name.

Using the Subcommands of DISPLAY: The subcommands of the DISPLAY subcommand are:

CHANGE

Changes the displayed entry (valid only with the READ UPDATE function).

INSERT

Inserts a new index entry immediately preceding the entry that is displayed (valid only with the READ UPDATE function).

NEXT Displays the next entry.

DELETE

Deletes the displayed entry (valid only with the READ UPDATE function).

END Ends the DISPLAY function.

The CHANGE subcommand of DISPLAY: This subcommand is valid only with the READ UPDATE function.

The CHANGE subcommand allows you to change the following:

- The name
- The RBA (relative byte address) of the index entry displayed
- The RBA of the segment specified
- The compression count (or the entry identifier byte or both)

The changed entry is displayed. Enter the NEXT subcommand or a null line to display the next entry.

Syntax of the CHANGE subcommand of DISPLAY

```
CHANGE [ENTRY(entryname) CLASS(classname)] | [SEGMENT(segment-name)]  
      [GENERIC]  
      [RBA(rba)]  
      [COMP(xx)]  
      DUPLICATE|NODUPLICATE
```

where:

ENTRY(*entryname*)

specifies the index entry where the display begins. If you do not specify an entry name, the display begins at the first entry in the index block; the entry name can be from 1 to 255 alphanumeric characters, which can be enclosed in quotation marks or not, and can contain hexadecimal data.

To specify a mixed-case entry name, you must enclose *entryname* in quotes. If you do not enclose *entryname* in quotes, alphabetic characters in *entryname* are treated as uppercase characters, regardless of the case in which you enter them.

If you specify an entry name, you must specify a class name.

CLASS(*classname*)

must be one of the following:

- GROUP
- USER
- DATASET
- The class name of the general resource

The length of name plus the compression count cannot exceed 255. To create a fully compressed name, specify ENTRY (' '), where the entry name is a null string, with a nonzero compression count. For a discussion of compression and an explanation of index blocks and encoding, see "Index entries" on page 111.

SEGMENT(*segment-name*)

specifies the segment RBA to be changed.

The BASE segment cannot be specified as the segment name.

The ENTRY and CLASS keywords and the SEGMENT keyword are mutually exclusive. If both are specified, SEGMENT is ignored.

If you specify SEGMENT, only the RBA (relative byte address) of the SEGMENT is changed.

GENERIC

indicates that the index entry name specified in ENTRY(*entryname*) is a generic name.

RBA(*rba*)

the value of *rba* can be from 1 to 8 hexadecimal characters or from 1 to 10 decimal characters.

COMP(*xx*)

the front-end compression count. *xx* is limited to one less than the length of the entry, and never exceeds 254. *xx* can be specified as decimal or hexadecimal characters.

DUPLICATE

means that you want to make the entry a duplicate of the entry immediately following. This entry that immediately follows might be on the same block or appear at the beginning of the next block.

NODUPLICATE

means that you do not want the current entry to be a duplicate of the entry immediately following.

There is no default on this keyword; if you do not specify DUPLICATE or NODUPLICATE, the entry identifier byte is not changed. It remains at its previous setting.

Specify only those keywords that you want to change. The others remain at their previous settings.

The BLKUPD command does not perform any checking to see if you have specified the appropriate keyword values to be changed. You must be very careful because specifying an incorrect keyword value or omitting a keyword and its value can produce unpredictable results.

The INSERT subcommand of DISPLAY: This subcommand is valid only with the READ UPDATE function.

Database format

The INSERT subcommand inserts a new index entry immediately preceding the entry that is displayed if SEGMENT is not specified. When SEGMENT is specified, the new segment ID is placed at the end of the segment array.

Note: The BLKUPD command cannot be used to insert the first entry in the database.

BLKUPD displays the new entry; entering the NEXT subcommand displays the original entry again.

Syntax of the INSERT subcommand of DISPLAY

```
INSERT [ENTRY(entryname) CLASS(classname)] | [SEGMENT(segment-name)]  
      [GENERIC]  
      RBA(rba)  
      [COMP(xx)]  
      [DUPLICATE|NODUPLICATE]
```

where:

ENTRY(*entryname*)

specifies the index entry where the display begins. If you do not specify an entry name, the display begins at the first entry in the index block. The entry name can be from 1 to 255 alphanumeric characters, which can be enclosed in quotation marks or not, and can contain hexadecimal data.

To specify a mixed-case entry name, you must enclose *entryname* in quotes. If you do not enclose *entryname* in quotes, alphabetic characters in *entryname* are treated as uppercase characters, regardless of the case in which you enter them.

If you specify an entry name, you must specify a class name.

CLASS(*classname*)

must be one of the following:

- GROUP
- USER
- DATASET
- The class name of the general resource

The length of name plus the compression count cannot exceed 255. To create a fully compressed name, specify ENTRY (' '), where the entry name is a null string, with a nonzero compression count. For a discussion of compression, see "Index entries" on page 111.

SEGMENT(*segment-name*)

specifies the new segment to be inserted.

The BASE segment cannot be specified as the segment name.

The ENTRY and CLASS keywords and the SEGMENT keyword are mutually exclusive. If both are specified, SEGMENT is ignored.

GENERIC

indicates that the index specified in ENTRY(*entryname*) is a generic name.

RBA(*rba*)

the value of *rba* can be from 1 to 8 hexadecimal characters or from 1 to 10 decimal characters.

COMP(xx)

the front-end compression count. *xx* is limited to one less than the length of the entry, and never exceeds 254. *xx* can be specified as decimal or hexadecimal characters.

DUPLICATE

means that you want to make the entry a duplicate of the entry immediately following. This entry that immediately follows might be on the same block or appear at the beginning of the next block.

NODUPLICATE

means that you do not want the current entry to be a duplicate of the entry immediately following.

The *NEXT* subcommand of *DISPLAY*: The *NEXT* subcommand displays the next entry.

Syntax of the *NEXT* subcommand of *DISPLAY (READ)*

```
NEXT
N
```

Entering a null line also displays the next entry.

The *DELETE* subcommand of *DISPLAY*: This subcommand is valid only with the **READ UPDATE** function.

The *DELETE* subcommand deletes the current index entry or segment, and the next entry is displayed.

Attention

Before you change or delete the first entry in the index, or insert a new first entry, you must first decompress any compressed entries that follow in the index block.

The best way to decide which entries to decompress is to display the index block and then examine the names and their compression counts, paying attention to the second entry in the block. If the second entry is compressed, or does not match the first entry enough to allow for proper decompression of the following entries, you must first delete the first entry and then do the following to each entry that needs decompression:

- If the entry has a compression count, enter a CHANGE command:

```
CHANGE COMP(0) ENTRY(xxxyyy) CLASS(classname)
```

where *xxx* is the compressed front-end characters as indicated by the old compression count, and *yyy* is the name that the BLKUPD command gave you as the name of this entry. (Note that you need the GENERIC keyword on the CHANGE command if the entry is generic.)

The second entry (now the new first entry) has now been changed.

- If this entry matches the old (first) entry for enough characters to decompress the remaining entries, you can stop. If it doesn't, you must decompress any entry that this new first entry does not match.
- To do so, enter NEXT commands until you get to the next entry that has to be changed. Then enter the CHANGE command to alter it as in the step above. Continue with the NEXT and CHANGE commands until all the entries in question have been resolved.

It might only be necessary to decompress that second entry; however, based on your examination of the listing, you might have to decompress all the entries. For an explanation of compression, see "Index entries" on page 111.

Syntax of the DELETE subcommand of DISPLAY

```
DELETE [SEGMENT(segmentname)]  
D
```

where:

SEGMENT(*segment-name*)

deletes the specified segment from the current index entry.

The END subcommand of DISPLAY: This subcommand ends the DISPLAY subcommand.

You can continue to examine or update the block under the READ subcommand.

Syntax of the END subcommand of DISPLAY

```
END SAVE  
NOSAVE
```

where:

SAVE

tells RACF to update the new index block to reflect the changes made under the DISPLAY subcommand. Specifying SAVE means that you want the new index block to replace the old one.

NOSAVE

tells RACF to ignore all the changes you made under the DISPLAY subcommand with the UPDATE keyword specified on the READ subcommand.

If you did not specify UPDATE on the READ command, then the NOSAVE option is forced.

The REREAD subcommand: The REREAD subcommand is valid only with the READ UPDATE function.

The REREAD subcommand allows you to overlay the new RACF block in the work area with the old block. Use this function when you have made errors to the new block while using the DISPLAY or REP subcommands. This subcommand gives you a new copy of the old block.

Syntax of the REREAD subcommand of READ UPDATE

REREAD

The END subcommand of READ: The END subcommand ends processing on the RACF database block that you obtained by entering the READ command.

Syntax of the END subcommand of READ

END SAVE
 NOSAVE

where:

SAVE

specifies that you want the new block to be written back to the RACF database to replace the old one that was read.

NOSAVE

specifies that the RACF database not be updated with the new block. The NOSAVE option is forced if you did not specify the UPDATE keyword on the READ command or if you did not make any changes to the block.

If you want to use the READ function to examine or update another block, enter another subcommand.

The END subcommand of BLKUPD: The END subcommand ends BLKUPD.

The syntax of the END subcommand (of BLKUPD)

END

If you want to read another block, do not enter this final end statement (just enter another subcommand of the BLKUPD command).

Database format

The BLKUPD command—A scenario

This example illustrates the functions of BLKUPD. It is not meant to be used for repairing your RACF database.

1. Issue the BLKUPD command on the RACF data set that you want to work with.

```
BLKUPD 'SYS1.RACF'  
BLKUPD:
```

2. Replace a string in the block located at RBA X'E000'.

```
READ X'E000' UPDATE  
BLKUPD:
```

reads the block at RBA X'E000' and specifies that changes are to be made to the block.

```
FORMAT
```

produces a formatted listing of the OLD index block obtained by the READ command.

```
BLOCK WITH RBA OF 00000000E000  
OFFSET COMP.          ENTRY NAME          RBA          BAM  
COUNT              BLOCK BYTE BIT  
00E 000 BEATL          00000000DC00 00 02F 4  
02A 000 HILDE          00000000D000 00 02E 0  
                                SEGMENT NAME: TSO  
                                DFP          00000000D900 00 02F 1  
                                00000000DA00 00 02F 2  
051 000 HILDE.RDS.CNTL 00000000DE00 00 02F 6  
073 000 IBMUSER        00000000D700 00 02E 7  
08E 000 M267           00000000DB00 00 02F 3  
0A6 000 M550ABC        00000000DD00 00 02F 5  
0C1 000 SALES           00000000DF00 00 02F 7  
0DA 000 SALES.* (G)    00000000F000 00 032 0  
0F5 000 SECLABEL-SYSHIGH 00000000D100 00 02E 1  
119 000 SECLABEL-SYSLOW 00000000D200 00 02E 2  
13C 000 SECLABEL-SYSNONE 00000000D300 00 02E 3  
160 000 SYSCTLG        00000000D600 00 02E 6  
17B 000 SYS1           00000000D400 00 02E 4  
193 000 VSAMDSET       00000000D500 00 02E 5  
1AF 000 255 X'FF'S  
2BB          SEQUENCE SET POINTER          000000000000  
TOTAL NAMES IN THIS BLOCK-015. UNUSED BYTES-3358. AVERAGE NAME LENGTH-025.  
LEVEL NUMBER-01. DISPLACEMENT TO LAST KEY-02BB. DISPLACEMENT TO FREE SPACE-02C4  
(G) - ENTITY NAME IS GENERIC
```

3. Find the string in the old block.

```
FIND M267  
IRR63002I Offset is X'0000009A'  
BLKUPD:
```

locates the offset of the character string 'M267' in the old block.

4. Verify that offset X'9A' in the new block contains the character string 'M267' and replace that string with the character string 'M270'.

```
REP M270 OFFSET(X'9A') VER(M267)  
IRR63004I REPLACE complete.
```

5. List the modified area of the new block (8 bytes beginning at offset X'9A').

```
LIST NEW RANGE(X'9A',8)00000000E000  
009A D4F2F7F0 01010000  
*M270.... *
```

6. Delete the first entry in the index block.

```
BLKUPD:
DISPLAY
  OFFSET COMP.      ENTRY NAME      RBA
      COUNT
  00E   000   SIVLE      00000000DC00
DELETE
```

deletes the index entry just displayed. The next entry, which moves up to replace the deleted one, is displayed.

```
IRR63036I The first index entry has been deleted. The rest of the index
block may need to be updated.
  00E   000   HILDE
                                         00000000D000
                                         SEGMENT NAME: TSO 00000000D900
                                         DFP   00000000DA00
```

7. Insert a new first index entry.

```
INSERT ENTRY(SIVLE) CLASS(USER) RBA(X'DC00')
```

inserts a new index entry, with the specified name and RBA immediately preceding the entry just displayed. The new entry is displayed.

```
IRR63038I The first index entry has been inserted. The rest of the index
block may need to be updated.
  00E   000   SIVLE      00000000DC00
NEXT
```

displays the next index entry.

```
00E   000   HILDE
                                         00000000D000
                                         SEGMENT NAME: TSO 00000000D900
                                         DFP   00000000DA00
```

8. Change the name of the entry.

```
04C 000   HILDE.RDS.CNTL      00000000DE00
CHANGE ENTRY(HILDE.RDS.CHNG) CLASS(DATASET)
```

changes the entry name of the entry.

```
04C 000   HILDE.RDS.CHNG      00000000DE00
```

9. Save the changes you have made and obtain a listing of your updated block.

```
END SAVE
```

ends the DISPLAY command and saves the changes that were made in the index block. The utility still runs under the READ subcommand.

```
IRR63009I DISPLAY ended. Changes saved.
FORMAT NEW
```

produces a formatted listing of the updated index block.

```
BLOCK WITH RBA OF 00000000E000
OFFSET COMP.      ENTRY NAME      RBA      BAM
      COUNT      BLOCK BYTE BIT
  00E   000   SIVLE      00000000DC00  00  02F  4
  025   000   HILDE      00000000D000  00  02E  0
                                         SEGMENT NAME: TSO 00000000D900  00  02F  1
                                         DFP   00000000DA00  00  02F  2
  04C   000   HILDE.RDS.CHNG 00000000DE00  00  02F  6
  06E   000   IBMUSER      00000000D700  00  02E  7
  089   000   M270        00000000DB00  00  02F  3
  0A1   000   M550ABC     00000000DD00  00  02F  5
  0BC   000   SALES       00000000DF00  00  02F  7
  0D5   000   SALES.* (G) 00000000F000  00  032  0
  0F0   000   SECLABEL-SYSHIGH 00000000D100  00  02E  1
  114   000   SECLABEL-SYSLow 00000000D200  00  02E  2
  137   000   SECLABEL-SYSNONE 00000000D300  00  02E  3
```

Database format

```

15B 000 SYSCTLG                00000000D600 00 02E 6
176 000 SYS1                   00000000D400 00 02E 4
18E 000 VSAMDSET              00000000D500 00 02E 5
1AA 000 255 X'FF'S
2B6      SEQUENCE SET POINTER          000000000000
TOTAL NAMES IN THIS BLOCK-015. UNUSED BYTES-3363. AVERAGE NAME LENGTH-024.
LEVEL NUMBER-01. DISPLACEMENT TO LAST KEY-02B6. DISPLACEMENT TO FREE SPACE-02BF
(G) - ENTITY NAME IS GENERIC

```

10. Save the changes made and write them back to the RACF database.

```

END SAVE
IRR63013I READ ended. Block saved.

```

ends the READ command and writes the new block out to the RACF database.

11. Locate the block that contains the generic name of SALES.*.

```

LOCATE ENTRY(SALES.*) CLASS(DATASET) GENERIC

```

displays a formatted list of the level one block that contains the generic entry name 'SALES.*'.

```

BLOCK WITH RBA OF 00000000E000
OFFSET COMP.          ENTRY NAME          RBA          BAM
COUNT                                     BLOCK BYTE BIT
00E 000  SIVLE                00000000DC00 00 02F 4
025 000  HILDE                00000000D000 00 02E 0
                                     SEGMENT NAME: TSO
                                     DFP
04C 000  HILDE.RDS.CHNG       00000000DE00 00 02F 6
06E 000  IBMUSER              00000000D700 00 02E 7
089 000  M270                  00000000DB00 00 02F 3
0A1 000  M550ABC              00000000DD00 00 02F 5
0BC 000  SALES                 00000000DF00 00 02F 7
0D5 000  SALES.* (G)          00000000F000 00 032 0
0F0 000  SECLABEL-SYSHIGH     00000000D100 00 02E 1
114 000  SECLABEL-SYSLOW      00000000D200 00 02E 2
137 000  SECLABEL-SYSNONE     00000000D300 00 02E 3
15B 000  SYSCTLG                00000000D600 00 02E 6
176 000  SYS1                   00000000D400 00 02E 4
18E 000  VSAMDSET              00000000D500 00 02E 5
1AA 000  255 X'FF'S
2B6      SEQUENCE SET POINTER          000000000000
TOTAL NAMES IN THIS BLOCK-015. UNUSED BYTES-3363. AVERAGE NAME LENGTH-024.
LEVEL NUMBER-01. DISPLACEMENT TO LAST KEY-02B6. DISPLACEMENT TO FREE SPACE-02BF
(G) - ENTITY NAME IS GENERIC

```

12. End the BLKUPD session.

```

BLKUPD:
END
READY

```

terminates the BLKUPD command.

Chapter 5. Error recovery for RACF Remote Sharing Facility (RRSF)

This chapter describes:

- The flow of a directed command in a RACF remote sharing facility (RRSF) environment
- The types of errors experienced in an RRSF environment
- Handshaking between RRSF nodes
- The connection states of RRSF nodes and the transitions between them
- Actions to recover from an RRSF failure
- The recording of RRSF errors

RRSF moves the RACF command between the user who initiated the command and the RACF subsystem address space where the transaction is processed (either on a local or a remote node) and moves the RACF command output between the RACF subsystem address space where the transaction was processed (on a local or a remote node) and the node where the user was logged on when the transaction was initiated.

The INMSG data set is used to temporarily hold requests that are being sent to the local node from itself or a remote node, such as commands directed to the local node or output from RACF commands that were directed to a remote node. The OUTMSG data set is used to temporarily hold requests that are being sent to a target node, such as commands directed from the local node. If RRSF experiences a failure, it:

- Detects the error when it first occurs. This:
 - Prevents additional damage to the RACF subsystem address space and the RACF database.
 - Allows either the system programmer or the IBM support center to diagnose and fix the problem.
- Protects the rest of the RRSF network from damage by isolating the error to the failing node.
- Saves the work request for retry when the error has been corrected.

Figure 23 on page 138 shows an illustration of the flow of a directed command in an RRSF environment. The steps shown in this figure are:

1. A user issues a RACF command. This command enters the local node's OUTMSG data set while waiting to be sent to the remote node.
2. When this command is sent to the remote node to be processed, it enters the remote node's INMSG data set.
3. The command is processed in the remote node's RACF subsystem address space and the results are placed in the remote node's OUTMSG data set while waiting to be sent to the local node.
4. The results are sent to the local node and placed in the local node's INMSG data set until the output is returned to the user.

Types of errors

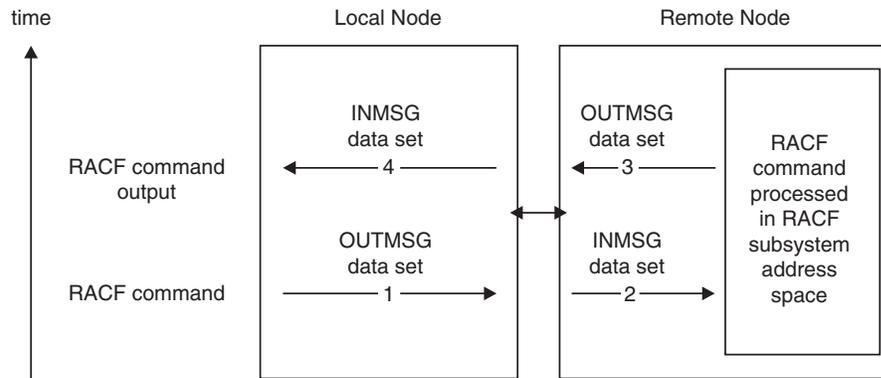


Figure 23. Flow of a Directed Command in an RRSF Environment

Types of errors in an RRSF environment

The following types of errors can be experienced by an RRSF network:

Definition errors

For RRSF, typical definition errors are local or remote nodes not being correctly defined to the system or to each other. In general, definitions need to be accurate and consistent on both the local and target node. Problems occur when there are:

- Incorrect VTAM® DEFINITIONS
- Incorrect LU names
- Down-level versions of RACF or RACF database templates
- Differences between node definitions to RACF (that is, something specified on the TARGET command at a local node was specified differently on a corresponding TARGET command at a remote node)
- Incorrect security information for APPC conversation
- Incorrect security information to access VSAM data sets
- Differences between node status (NODEA is operative while NODEB thinks NODEA is dormant).

Environmental errors

Typical environmental errors are MVS resources not being available. These can occur when MVS or RACF is being restarted or can occur because of high volumes of directed commands (including automatically directed commands) or password changes that are being synchronized. This type of error can occur on either the local or remote node, and includes:

- VTAM not yet active
- APPC address space not yet active
- Insufficient main memory
- Insufficient VSAM space
- Retryable APPC errors
- Remote RACF subsystem address space not active

Program errors

Overlaid control blocks, overlaid in-storage data, or programming errors within RRSF, and the portions of RACF invoked within the RACF subsystem address space can also cause an abend. Non-fatal errors detected by RRSF can have the following symptoms:

- Units of work being lost
- Units of work being done multiple times
- All tasks in the RACF subsystem address space being in wait state
- Resources are allocated to a request and the request has completed either normally or abnormally and the resources are not released or deallocated

Transmission and line errors

Transmission and line errors are external to the application, such as a car hitting a telephone pole.

Handshaking and state changes

Handshaking involves verifying that two RRSF nodes can communicate with each other and are compatible. Handshaking occurs whenever a TARGET command is issued to activate the connection between the local node and a remote node and if sufficient information has been provided. Activating a remote node connection requires sufficient information to do all of the following:

- Allocate and open the VSAM data sets (INMSG and OUTMSG data sets)
- Register the RACF subsystem address space as an APPC/MVS server
- Define the connection to the remote node (LUNAME, and optionally TPNAME and MODENAME)

Connection states of RRSF nodes

While at a high level there are two types of connections between nodes, operative and dormant, at a lower level the connection between two nodes can be in any one of a number of states.

The state of the connection between nodes and the transitions between the states used by RRSF have the following characteristics:

- Controls whether information is sent to the remote node.
- Respects the state change request of the last person who issued such a request; that is, the connection status is not changed from dormant to active without an explicit human action.
- Provides available information on how the connection reached the current state.
- Recognizes that certain state changes do not occur immediately because they need to check with the partner node to determine if the new state is allowed.

The following table shows the potential states that can exist on a local node to describe the connection between that node and a remote node:

Table 19. Connection States between Nodes

Name	Abbreviation	Description
operative pending connection	O-P-C	The local node has requested that the connection be activated and is attempting to activate the conversation. The local node has not yet received a confirmation that the remote node will accept the connection.

Handshaking and states

Table 19. Connection States between Nodes (continued)

Name	Abbreviation	Description
operative pending verification	O-P-V	The local node's request for a conversation has been accepted. The two nodes are communicating and evaluating information they have exchanged to determine if they are compatible. If the two nodes are not compatible, both nodes will remain in the operative pending verification state.
operative active	O-A	The connection between two nodes is active. The two nodes have verified that they can communicate with each other and that they are compatible with each other.
operative in error	O-E	The local system has lost the connection with the remote node. At one time a connection had been successfully established.
dormant by local request	D-L	The local node's connection with a remote node has been made dormant by an operator issuing a TARGET DORMANT command.
dormant by remote request	D-R	The local node has detected that the connection to the remote node has been made dormant by the remote node or the connection between the local and remote nodes has not been defined on the remote node.
dormant by mutual request	D-B	The local and remote nodes have both requested the connection be dormant by an operator issuing a TARGET DORMANT command on each system.
dormant in error	D-E	The local node is dormant and a failure is experienced while saving RRSF requests for later processing.
defined	DEF	TARGET information has been defined, but no conversation occurs. This state occurs: <ul style="list-style-type: none"> • Between member systems of a multisystem node. Systems in a multisystem node do not communicate with each other. • Between a local nonmain system and a nonmain system on a remote multisystem node. Nonmain systems of multisystem nodes can communicate with single-system nodes and with the main systems of multisystem nodes, but they do not communicate with nonmain systems of other multisystem nodes.
not defined (initial)	???	No connection has been established to the node due to insufficient configuration information, or because a TARGET OPERATIVE or TARGET DORMANT command has not been issued for the node.

These connection states describe the state of the local node as well as the state of a connection between the local node and a remote node.

For example, from the local node perspective, operative active (O-A) means that the local node is now an APPC server and is able to accept connections to remote

nodes. Dormant by local request (D-L) means that it is no longer an APPC server (or never was an APPC server) and no NEW conversations are accepted (existing O-A conversations are unaffected).

These connection states also describe the state of the local node when you have no remote node connection because you haven't specified PROTOCOL information. The local node can be operative active (O-A), but will NOT be an APPC server. The local node can be dormant by local request (D-L), but not dormant by remote request (D-R) or dormant by mutual request (D-B). If VSAM errors occur, the local node can be either operative in error (O-E) or dormant in error (D-E).

Connection state changes after a successful TARGET command

The following table shows the connection state as seen on the local node after a successful TARGET command is issued on the local node to change the connection state between the local and remote nodes.

For example, if the connection state as seen on the local node is operative in error (O-E) and the local node issues a successful TARGET DORMANT command, the connection state, as seen by the local node, would be dormant by local request (D-L).

Table 20. Table of New Connection States Based on a Successful TARGET Command

Previous Connection State	After a successful TARGET OPERATIVE command	After a successful TARGET DORMANT command	After a successful TARGET DELETE command
O-A	O-P-C	D-L	error message received
O-P-C	O-P-C	D-L	error message received
O-P-V	O-P-C	D-L	error message received
O-E	O-P-C	D-L	error message received
D-L	O-P-C	D-L	connection deleted
D-R	O-P-C	D-B	error message received
D-B	O-P-C	D-B	connection deleted
D-E	O-P-C if INMSG and OUTMSG workspace data sets can be opened, else D-E	D-L if INMSG and OUTMSG workspace data sets can be opened, else D-E	connection deleted
DEF	DEF Message IRRM035I is issued to syslog.	DEF Message IRRM035I is issued to syslog.	connection deleted

Actions to recover from an RRSF failure

RRSF can experience the following types of failures:

1. An ABEND that causes ESTAE processing. For detailed information, see "RRSF ESTAE processing" on page 142.

Recovery actions

2. An error return code from an MVS system service. For detailed information, see “Failure of MVS System Service”.
3. An error return code from APPC/MVS. For detailed information, see “APPC return code handling” on page 144.
4. An error return code from a request to VSAM. For detailed information, see “VSAM failures” on page 145.

RRSF ESTAE processing

ESTAE or ESTAI processing occurs when MVS detects an abnormal end during processing of a task within the RACF subsystem address space.

The actions indicated in the following section are normally done internally by RACF itself. However, in some cases, a manual RESTART command might be necessary.

The following is done during recovery processing:

1. If the task that failed had not abended during recovery processing:
 - a. If the task is initializing:
 - 1) The task terminates to clean up its resources.
 - 2) Another attempt is made to re-create the task.
 - b. If the task is processing an item:
 - 1) The queue of waiting work is preserved.
 - 2) The current task is marked as being in recovery processing.
 - 3) In-use resources for the current item are freed.
 - 4) The current item is restarted.
 - c. If the task is terminating, termination continues and the abend is ignored.
 - d. If the task that failed is in recovery processing:
 - 1) Resources in use for the task are released.
 - 2) If the failure occurs when processing the same item for the second time, the item is deleted and output to be returned to the originator is created.
 - 3) The task that has failed is restarted.

Failure of MVS System Service

When an error return code from an MVS system service is detected, an attempt is made to recover the work being done by RRSF. The basic retry scheme depends on where the error is detected. Most of the tasks within RRSF have the following structure:

1. An initialization section
2. A processing loop
3. A termination section

If errors are detected in the initialization section, the error is recorded and the task is restarted.

Note: The RACF subsystem address space currently attempts to restart a task *five* times before an abend is issued.

The actions indicated in the following section are normally done internally by RRSF itself. However, in some cases, a manual RESTART command might be necessary.

If errors are detected within the processing loop, the following steps are done:

Recovery actions

1. An entry is created in the LOGREC data set at the time of failure.
2. The element is retried.
3. If retry fails,
 - a. Another entry is created in the LOGREC data set.
 - b. The failing item is discarded.
 - c. If possible, returned output is sent to the originator.
 - d. The task is restarted.

If errors are detected in the termination section, the error is recorded and termination continues. The termination code is usually entered when the task in the RACF subsystem address space is being restarted or stopped.

APPC errors

APPC is the communications vehicle for sending and receiving messages from one RRSF node to another. This section discusses:

- Initializing connection errors
- APPC return code handling
- APPC and the RACF RESTART command
- VSAM failures

Initializing of connections

There is a class of problems that occur because of the order that the MVS address spaces become activated during a system IPL. As an MVS system is being IPLed, address spaces reach a state in which they are able to service requests at different rates. Therefore, there is no assurance that the VTAM and APPC address spaces, that are necessary to service RRSF requests, are available when the RACF subsystem address space issues its first request.

Attempting to activate the connections or send information to remote nodes when the RACF subsystem address space is started, but before VTAM and APPC have completed initialization, result in APPC failures. Normally, such APPC failures cause the connections between the two nodes to become operative in error when the first attempt is made. Instead, RRSF allows the RACF subsystem address space to continue to poll for APPC/MVS availability and when available, attempts to register the RACF subsystem address space as an APPC/MVS server.

If the RRSF APPC server fails to successfully register with APPC/MVS, error message IRRRC023I is issued to the MVS operator console and RRSF initialization discontinues.

A registration attempt to APPC/MVS also occurs if:

- A local node is in a dormant state,
- A TARGET command is issued to make the connection operative, and
- Protocol information has been supplied.

A subsequent TARGET LIST command against the node would show a connection state of operative active.

Note: If MODENAME is not specified in the TARGET command, RACF sends a default name to APPC that allows the connection to complete successfully. This default name, IRRMODE, is placed in IRRNODE. However, since there was no explicit specification by the user and the default name is a RACF internal, the TARGET LIST output shows “NOT SPECIFIED”.

Recovery actions

APPC return code handling

The actions indicated in the following section are normally done internally by RRSF itself. However, in some cases, a manual RESTART command might be necessary.

The MVS callable system services, that are used to implement the APPC or LU6.2 protocols, provide return codes to report the status of the request. Normally, a failure causes:

- The connection to be marked as operative in error
- A symptom record to be created in the LOGREC data set. See “Creation of LOGREC data set entries” on page 147 for details.

However, if RACF receives one of the following three error conditions back from APPC, RACF retries the error:

- Allocate_failure_retry
- TP_not_available_retry
- Resource_failure_retry

If after 10 times, RACF still receives an error return code, it is considered a non-retryable error and:

- The connection is marked as operative in error.
- A symptom record is created in the LOGREC data set. See “Creation of LOGREC data set entries” on page 147 for details.

APPC missing interrupts: Another type of APPC error occurs when the MVS callable system service that attempts to perform an APPC function never completes. One way this can occur is if the partner remote RACF subsystem address space starts the TP program, but doesn't complete the request. A missing interrupt handler (MIH) uses a timer to wait for the transaction to complete. When the timer expires, the MIH breaks the connection and declares an error. The connection between the two nodes is marked as operative in error and message IRR022I is issued.

APPC and the RACF RESTART command

The RESTART command provides a way to recycle or recover a hung or stopped task. See *z/OS Security Server RACF Command Language Reference* for the syntax of the RESTART command.

The preferred way to recycle a connection is not to use the RESTART command. Instead, the operator should use the TARGET command to make the connection to the node dormant and then operative. This method fails if the task is hung waiting for outstanding work. Use the RESTART command to recycle a connection only after an unsuccessful attempt at using the TARGET command to make that connection dormant and then operative.

On restart, the partner node always marks the sender as operative in error. The node being restarted then attempts to handshake with the partner to restore the connection.

Deleted node: A command can be executing in the RACF subsystem address space and the node definition for the node on which the command originated can be removed. While requiring the connection to the node to be dormant before it can be deleted reduces the probability of this occurring, it is still possible.

If a message is targeted to a node that is no longer defined to RRSF, the following actions are done:

- A symptom record is created.

- The command output or the command is discarded.

VSAM failures

The checkpoint information is stored in a VSAM key-sequenced data set (KSDS). These files can be unusable for a number of operational reasons, such as:

- There are I/O errors on the device that contains the VSAM data set.
- The operator has made the device inactive or unavailable.
- There is insufficient space to store the next record.

The actions indicated in the following section are normally done internally by RRSF itself. However, in some cases, a manual RESTART command might be necessary.

If VSAM errors occur on the INMSG or OUTMSG data set, that prevent the records from being written to or deleted from the data sets, RRSF does the following:

- Shuts down the connection by:
 - Rejecting all INBOUND APPC transactions by marking all affected successfully established connections as operative in error
 - Marking all dormant connections as dormant in error
 - Rejecting all directed commands that would require the use of the damaged VSAM data set
- Notifies the appropriate people by:
 - Writing a message to the system console
 - Creating a symptom record in the LOGREC data set
- Allows for correction by:
 - Attempting to close and de-allocate the VSAM data set that is experiencing errors

An error message is issued to the MVS operator console when a VSAM data set experiences an error. Some common error messages are IRRRC029I and IRRRC030I, which indicate problems in trying to write to the workspace data sets, and IRRRC031I, which indicates that a workspace data set is full. Associated messages IRRRC032I and IRRRC033I are also issued, indicating that the specified connection has received a DORMANT ERROR or OPERATIVE ERROR.

After the error has been corrected, the following commands must be processed to reactivate the connection:

```
TARGET NODE(nodename) DORMANT
TARGET NODE(nodename) WORKSPACE([current or new settings])
TARGET NODE(nodename) OPERATIVE
```

Note: RACF profiles are recommended to protect the INMSG and OUTMSG data sets.

Automatic direction and VSAM errors: Automatic direction should be transparent to most persons who issue RACF commands, change their passwords, or take actions that result in application updates. They are usually not aware that their actions have caused an RRSF request to be automatically directed. Therefore, VSAM errors are not reported to the issuer of the request. Instead, the users who are specified on the NOTIFY and OUTPUT keywords of the RACF SET command (which might include the command issuer via &RACUID) receive an error message that the RRSF request was not sent to the appropriate remote node because of a VSAM file failure.

Recovery actions

Why are VSAM failures treated differently than APPC failures or even failures within the RACF subsystem address space? VSAM failures are special and critical because the request and the returned output are checkpointed in the VSAM files. If the VSAM files are unusable, there is no record of the RACF request or the output.

When an RRSF request generated by automatic direction is processed and it experiences a hard VSAM failure (that is, it cannot be written to the file and has not already been saved somewhere else) the standard failure output is sent to the users who are specified on the NOTIFY and OUTPUT keywords of the RACF SET command. This hard VSAM failure can only occur on the node where the request originated and before it is stored in the OUTMSG data set for the target node. In all other cases of a VSAM failure, a copy of the request or output exists in another VSAM file.

Password synchronization and VSAM failures: If possible, VSAM failures for password synchronization requests are processed the same as a VSAM failure for a directed command. A password synchronization failure generates RRSFLIST output and an error message to the TSO user.

IRRBW00 utility and VSAM data sets: If you have a DASD problem or have a need for off-line diagnosis of the RRSF VSAM data sets, RACF has an APF-authorized utility called IRRBRW00 that allows you to dump the RACF data contained within the VSAM data sets. Because this utility provides the capability to dump sensitive RACF data such as RACF command text and returned output, be careful to control access to this utility.

In order to prevent inadvertent disclosure of the data in the VSAM data sets, RACF requires that a user have read access to the resource name IRRBRW00 in the RRSFDATA class in order to run the IRRBRW00 utility. If the class is not active or no profile is defined, the user is denied access to run the utility. The user also needs RACF access to the VSAM data set to be dumped. VSAM data sets can be protected via normal data set protection using profiles that protect the data set names:

- *prefix.sysname_or_wdsqual.INMSG*
- *prefix.sysname_or_wdsqual.OUTMSG*
- *prefix.local_luname.remote_luname_or_wdsqual.INMSG*
- *prefix.local_luname.remote_luname_or_wdsqual.OUTMSG*

To ensure the integrity of the data in these files, it is recommended that you set up these profiles and limit the access to only those with a need to know. You can use the RACF TARGET command to determine the VSAM data set names being used by the RACF remote sharing facility.

The IRRBRW00 utility is provided for diagnostic purposes only. For complete instructions on running IRRBRW00, see the RACJCL member of SYS1.SAMPLIB and read the IRRBRW00 sample.

Recording of errors

Environmental errors and transmission errors need to be reported to allow for their correction. When the RACF subsystem address space is unable to access a requested system resource, it records this type of error. Further, the RACF subsystem address space attempts to notify the originator of the command that it was unsuccessful. It might also need to stop transmitting to the affected node. The following mechanisms are used:

Recovery actions

- A symptom record is created on the system experiencing the failure and stored in the LOGREC data set.
- If possible, an error message reporting the failure is sent back in the RRSFLIST data set (standard returned output) when the failure is not in RRSF. If the failure is in RRSF, then only a symptom record is created. This returned output is an error message. If the failing request is in storage, the failing request is added to the output. To the system where the request originated, the returned output is identical to the output returned when a command has successfully processed.
- RRSF attempts to retry the error after creating the appropriate record of the failure.

APPC failures that reflect either transmission errors or definition errors do not cause an abend. Instead they cause the connection between the two nodes to be marked as operative in error. This prevents attempts to send commands until either the operator fixes the problem or the remote node activates the connection.

Creation of LOGREC data set entries

When the RACF subsystem address space requests an MVS system resource or uses an MVS system service and is unsuccessful, this failure is recorded. If the failure is not recorded by MVS, RACF puts the symptom records in the LOGREC data set.

z/OS MVS Programming: Assembler Services Guide categorizes information contained within the symptom records as:

- Component Data – This section identifies the application in which the error occurred (that is, RACF subsystem address space).
- Primary SDB symptoms – This section contains the primary string of problem symptoms. This data is used for duplicate problem recognition (See Table 21).
- Secondary SDB symptoms – This section contains any additional diagnostic values saved at the time of the error.
- Variable Data – This section contains diagnostic data, such as portions of data areas or parameter lists pertinent to the error.

Table 21 shows the contents of the primary symptom string that the symptom record contains.

Table 21. Contents of Primary Symptom String for a RACF Subsystem Address Space Error

SDB Key Literal	Usage
RIDS/	Module CSECT name
RIDS/	Load module name
PCSS/	System service (MVS or RACF macro) that failed
PRCS/	Return code from service
PRCS/	Reason code from service (if no reason code is available, this field contains a value of zero)

Table 22 shows the contents of the secondary symptom string that the symptom record contains.

Table 22. Contents of Secondary Symptom String for a RACF Subsystem Address Space Error

SDB Key Literal	Usage
ADRS/	Offset of service that failed

Recovery actions

Table 23 shows the contents of the variable symptom string that the symptom record contains.

Table 23. Potential Contents of Variable Symptom String for a RACF Subsystem Address Space Error

Field	Description
LUNAME	APPC partner LUNAME
TPNAME	APPC partner TPNAME
MODENAME	APPC partner MODE NAME
MISC STRING	Additional information for some service failures

Table 24 shows the additional information that the symptom record contains.

Table 24. Additional LOGREC Data for a RACF Subsystem Address Space Error

Field	Value
COMPDSC	RACF subsystem address space
PROBLEM	Name of failing service
SERVLEV	Service level of module
COMPID	Component ID (5752XXH00)
COMPLEV	Component level (260)

Chapter 6. Diagnosis reference for RACF

This chapter contains:

- Parameter list descriptions (see “Parameter list descriptions”)
- Process flows (see “Process flows for RACF” on page 182)

Parameter list descriptions

This section describes parameter lists passed to RACF when a RACF macro is invoked. Installation exits, which are described in *z/OS Security Server RACF System Programmer's Guide*, also use parameter lists, which are described in *z/OS Security Server RACF Data Areas*. See Appendix A, “The Inventory Control Block (ICB)” on page 225 for information on the ICB (inventory control block).

The parameter lists used by RACF in processing RACF commands and the RACF report writer are standard TSO/E parameter lists. See *z/OS TSO/E Customization* for information on these parameter lists.

The parameter lists used by RACF in processing RACF utilities and DSMON are standard MVS parameter lists.

Table 25 is a quick reference that identifies the system macro-request types that are replacements for the independent RACF system macros. For more information on both types, see *z/OS Security Server RACROUTE Macro Reference*.

Table 25. Cross-Reference for RACROUTE REQUEST=type, the Independent RACF System Macros, and the Parameter List Name

RACROUTE REQUEST=type	Independent RACF System Macro	Parameter List
REQUEST=AUDIT	None	AUDIT
REQUEST=AUTH	RACHECK	AUTH
REQUEST=DEFINE	RACDEF	DEFINE
REQUEST=DIRAUTH	None	DIRAUTH
REQUEST=EXTRACT	RACXTRT	EXTRACT
REQUEST=FASTAUTH	FRACHECK	FASTAUTH
REQUEST=LIST	RACLIST	LIST
REQUEST=SIGNON	None	SIGNON
REQUEST=STAT	RACSTAT	STAT
REQUEST=TOKENBLD	None	TOKENBLD
REQUEST=TOKENMAP	None	TOKENMAP
REQUEST=TOKENXTR	None	TOKENXTR
REQUEST=VERIFY	RACINIT	VERIFY
REQUEST=VERIFYX	None	VERIFYX

The following are the parameter lists in this section:

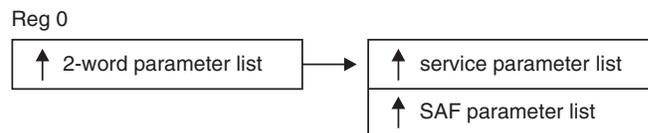
- “RACROUTE parameter list” on page 150
- “AUDIT service parameter list” on page 153
- “AUTH service parameter list” on page 154
- “DEFINE service parameter list” on page 158
- “DIRAUTH Service Parameter List” on page 164

Parameter descriptions

- “EXTRACT service parameter list” on page 164
- “FASTAUTH service parameter list” on page 167
- “LIST service parameter list” on page 168
- “SIGNON service parameter list” on page 169
- “STAT service parameter list” on page 170
- “TOKENBLD service parameter list” on page 170
- “TOKENMAP/TOKENXTR service parameter list” on page 174
- “VERIFY/VERIFYX service parameter list” on page 175
- “ICHEINTY parameter list” on page 179

“Checking the parameter list passed to RACF” on page 77 goes into detail to show you how to locate parameters in a dump. To do this, you find the contents of register 1.

If register 1 is zero, then the RACROUTE macro was issued, and module ICHRFR00 issued the RACF macro. In this case, register zero points to a two-word parameter list. The first word of this parameter list points to the RACF SVC parameter list, and the second word of this parameter list points to the SAF parameter list. This is shown in the following:



If register 1 is not zero, then this is the address of the parameter list passed with the macro request.

RACROUTE parameter list

The RACROUTE parameter list is also called the SAF router parameter list or the MVS router parameter list. It is mapped by macro ICHSAFP. For another description of this parameter list that includes field names, see *z/OS Security Server RACF Data Areas*.

Parameter descriptions

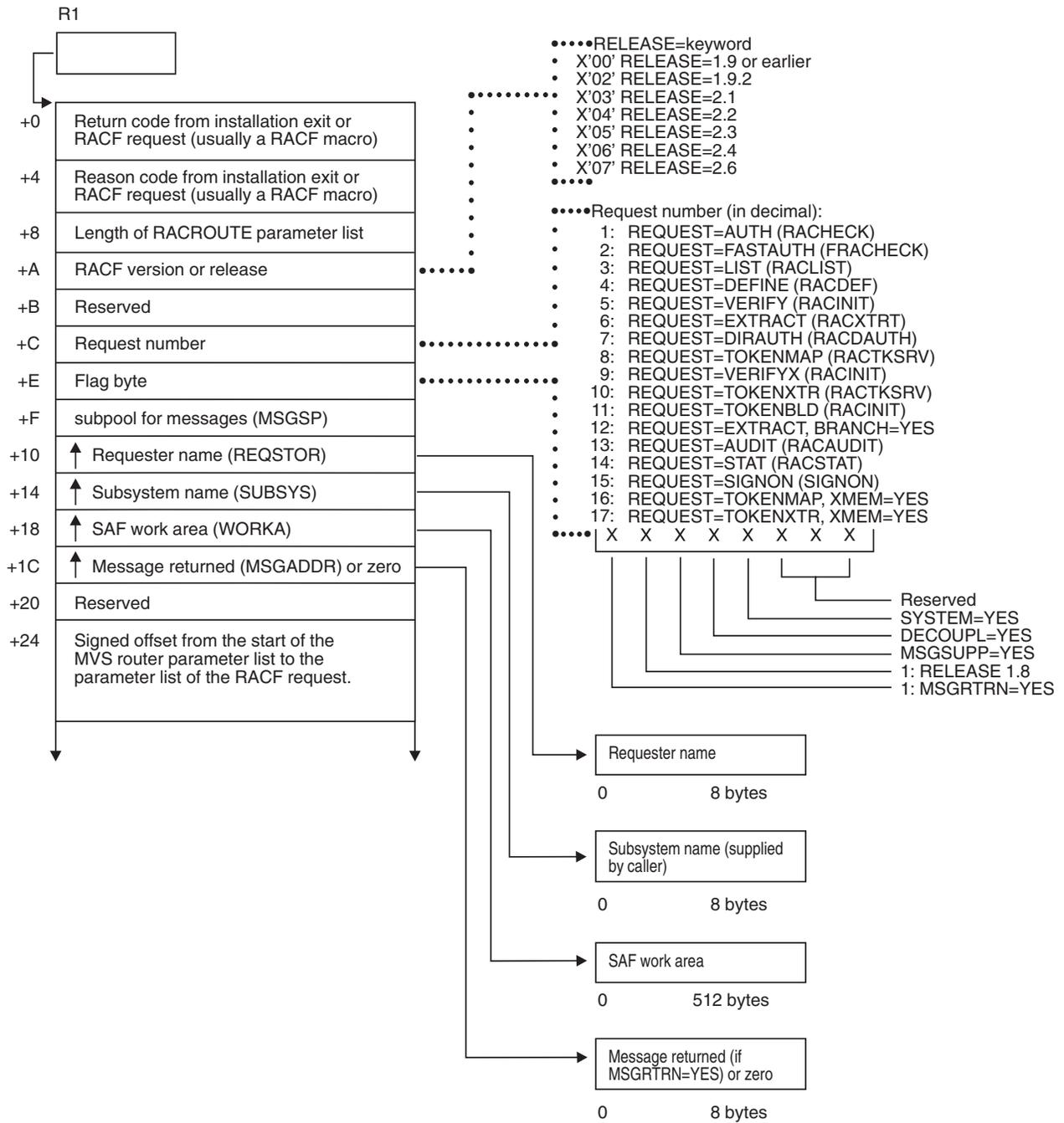


Figure 24. RACROUTE Parameter List (Part 1 of 2)

Parameter descriptions

These areas show up on both MVS and VM systems, but they are used only on VM.

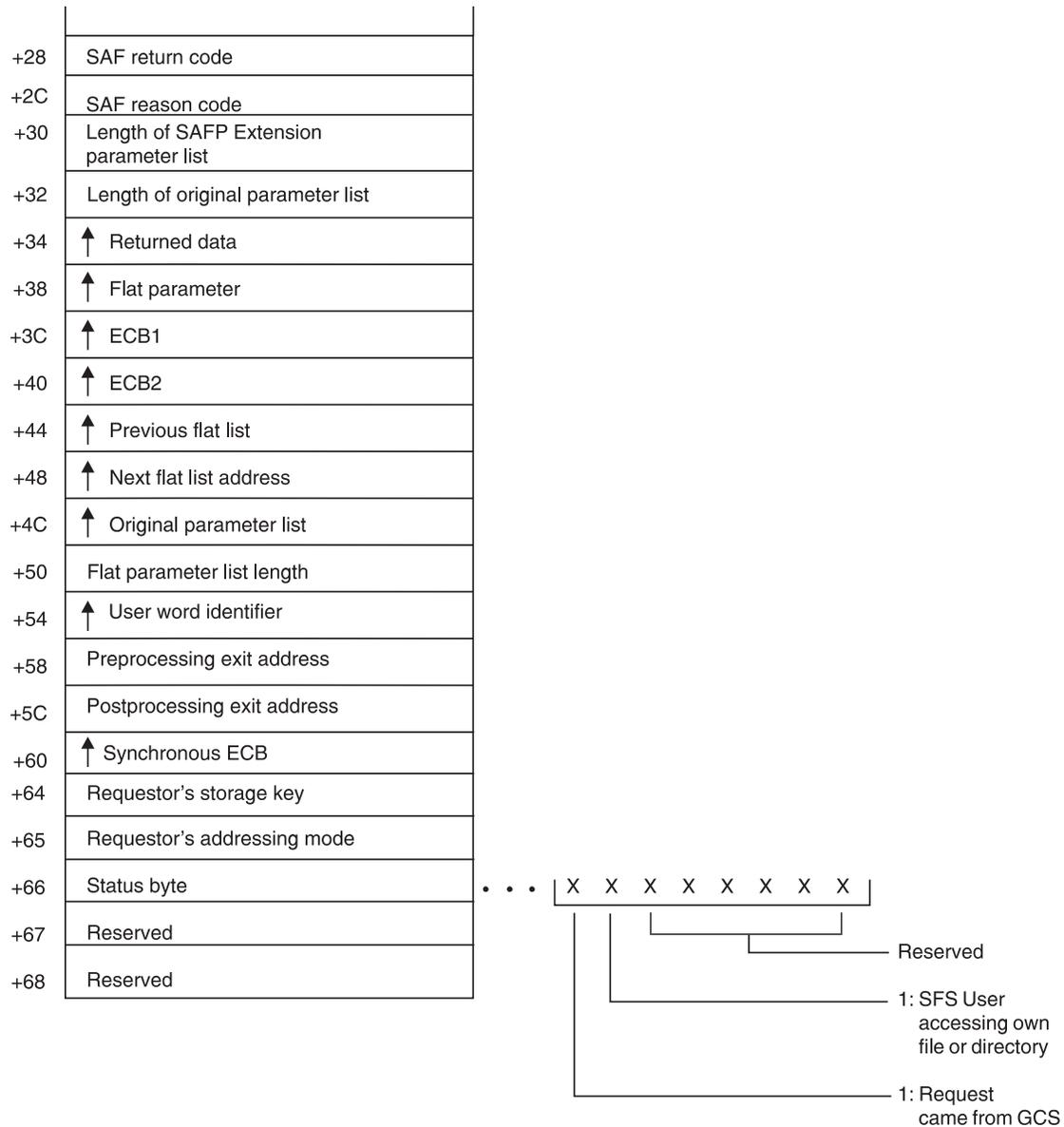


Figure 24. RACROUTE Parameter List (Part 2 of 2)

AUDIT service parameter list

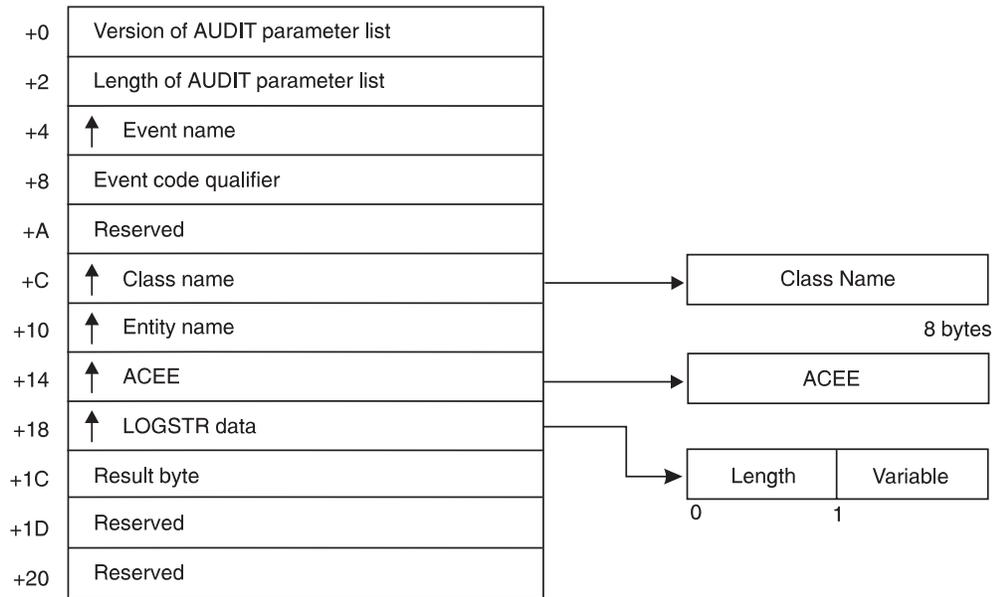
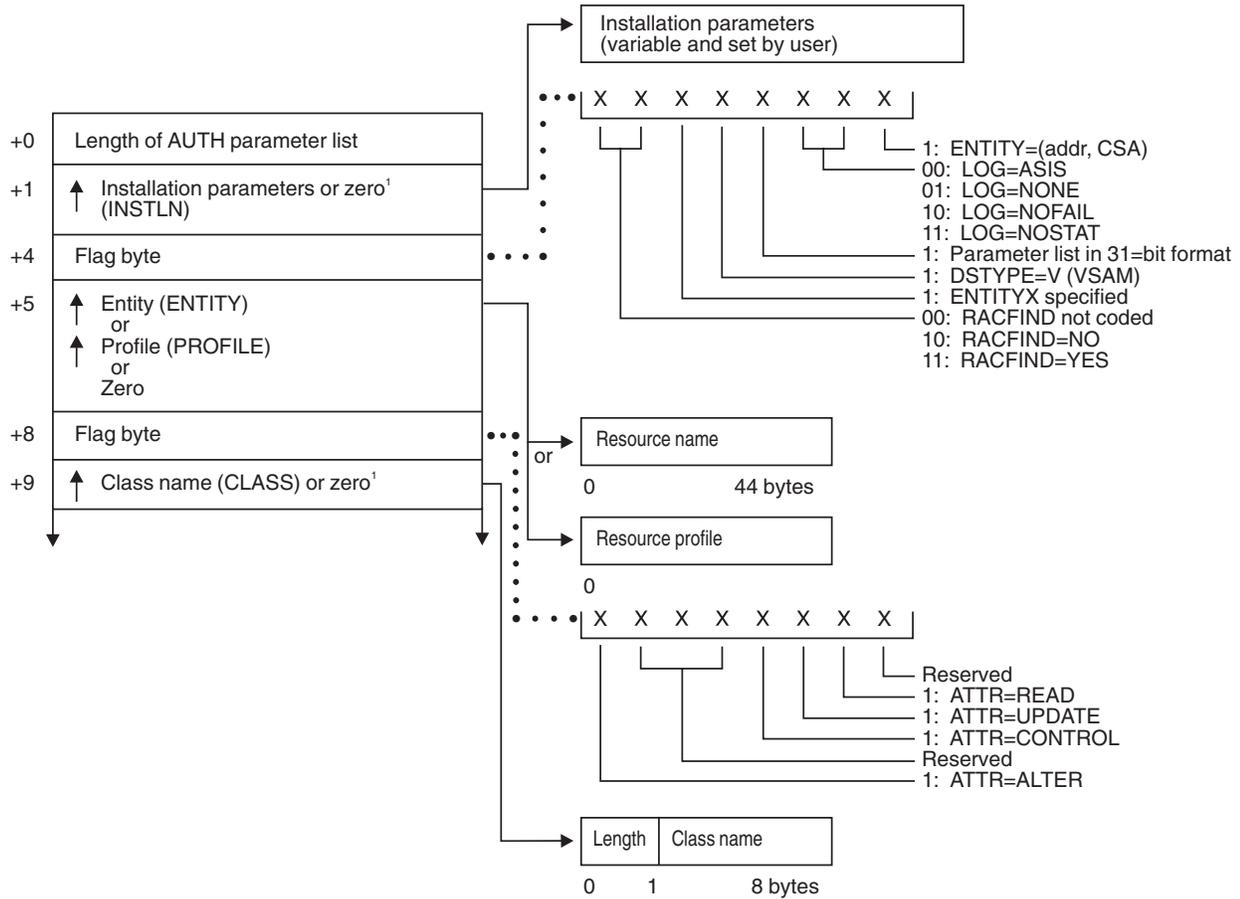


Figure 25. AUDIT Service Parameter List

AUTH parameters

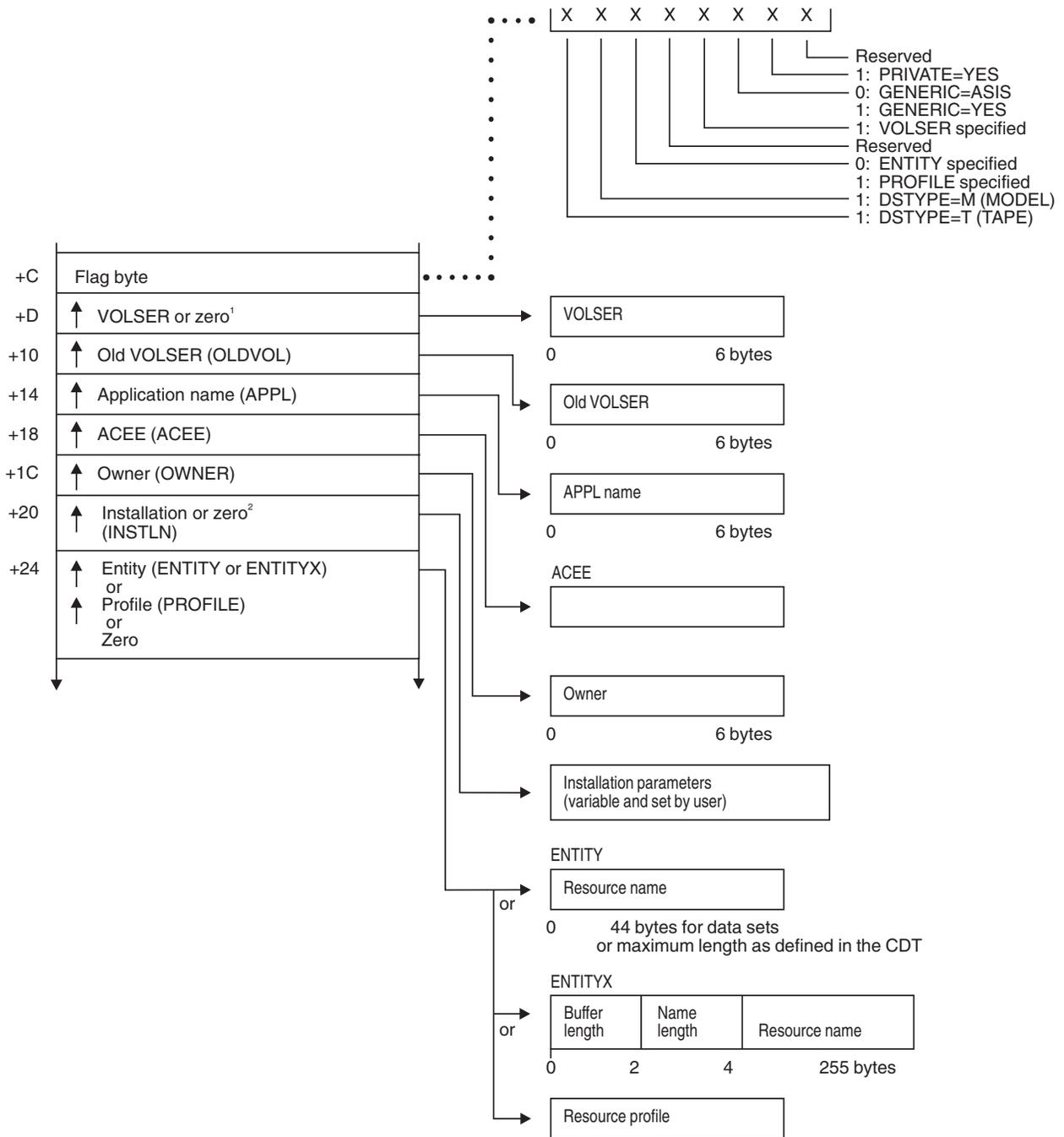
AUTH service parameter list



¹ This field is zero if bit 4 of the flag byte at offset 4 is one (input was RACROUTE REQUEST=AUTH).

Figure 26. AUTH Service Parameter List (Part 1 of 4)

AUTH parameters

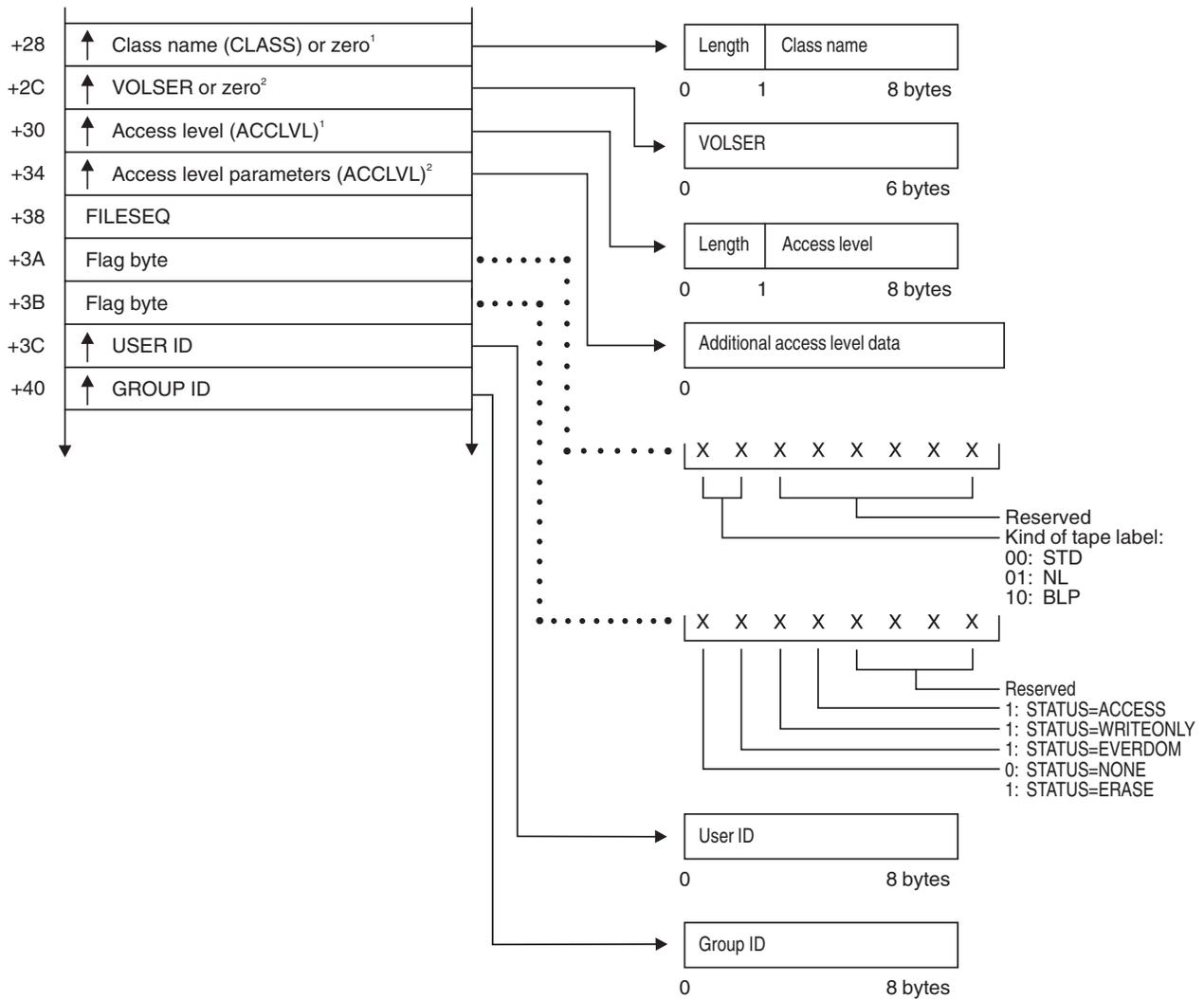


¹ This field is zero if bit 4 of the flag byte at offset 4 is one (input was RACROUTE REQUEST=AUTH).

² This field is zero if bit 4 of the flag byte at offset 4 is zero (input was RACHECK macro).

Figure 26. AUTH Service Parameter List (Part 2 of 4)

AUTH parameters



¹ This field is zero if bit 4 of the flag byte at offset 4 is one (input was RACROUTE REQUEST=AUTH).

² This field is zero if bit 4 of the flag byte at offset 4 is zero (input was RACHECK macro).

Figure 26. AUTH Service Parameter List (Part 3 of 4)

AUTH parameters

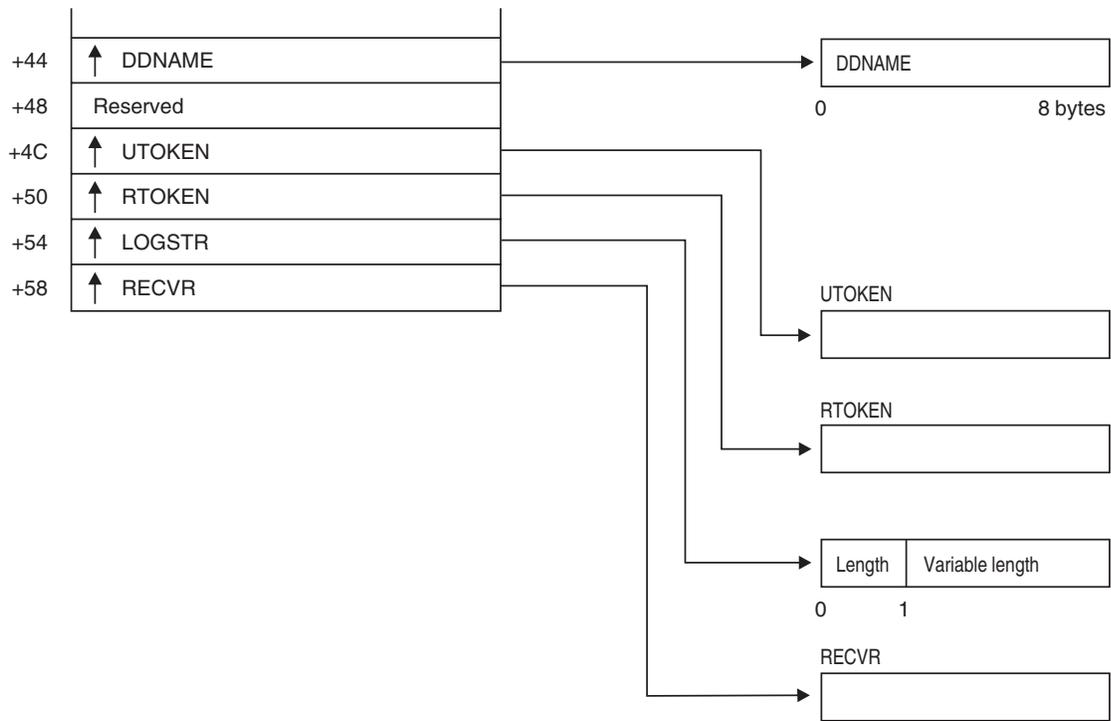
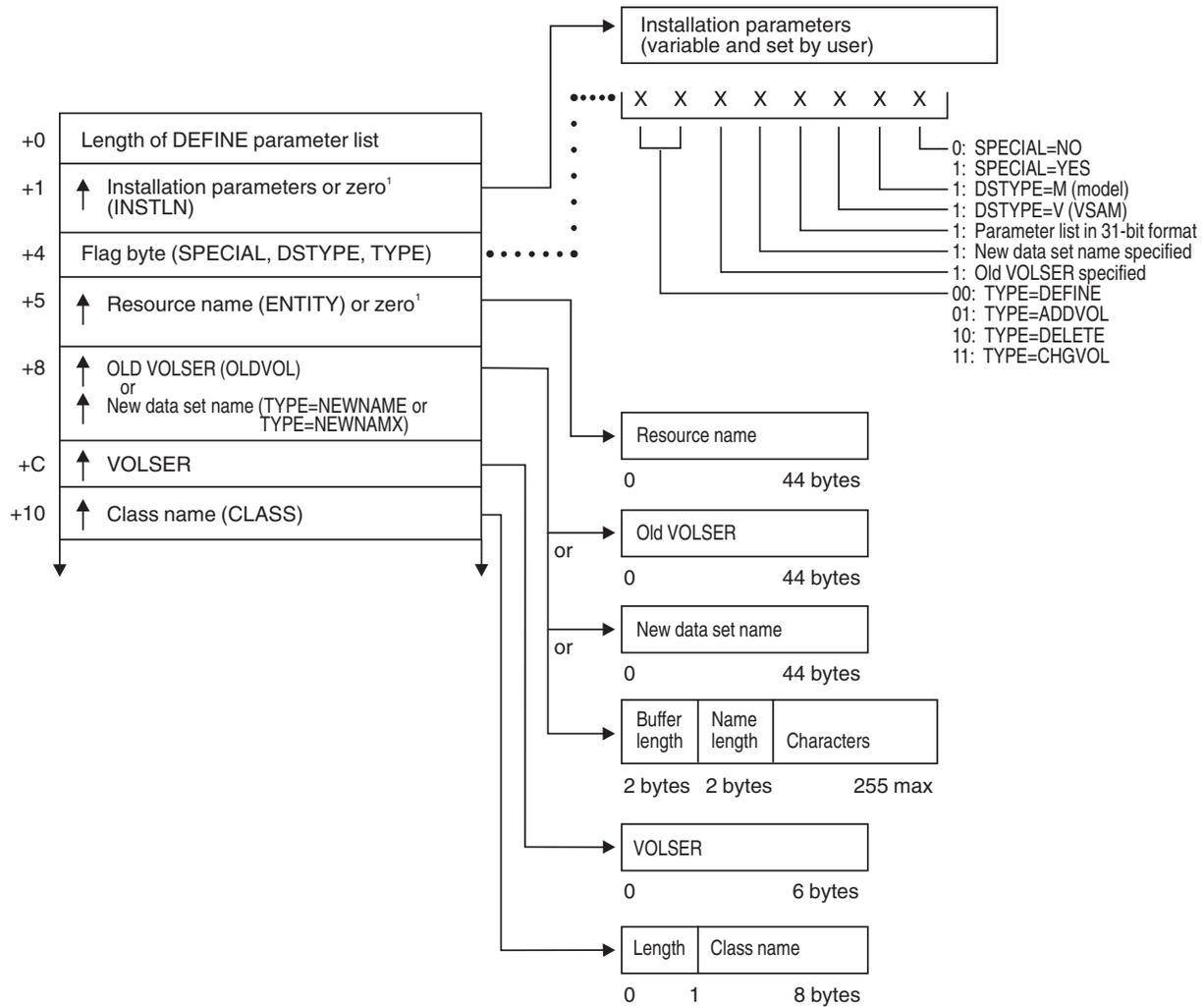


Figure 26. AUTH Service Parameter List (Part 4 of 4)

DEFINE parameters

DEFINE service parameter list



¹ This field is zero if bit 4 of the flag byte at offset 4 is one (input was RACROUTE REQUEST=DEFINE).

Figure 27. DEFINE Service Parameter List (Part 1 of 6)

DEFINE parameters

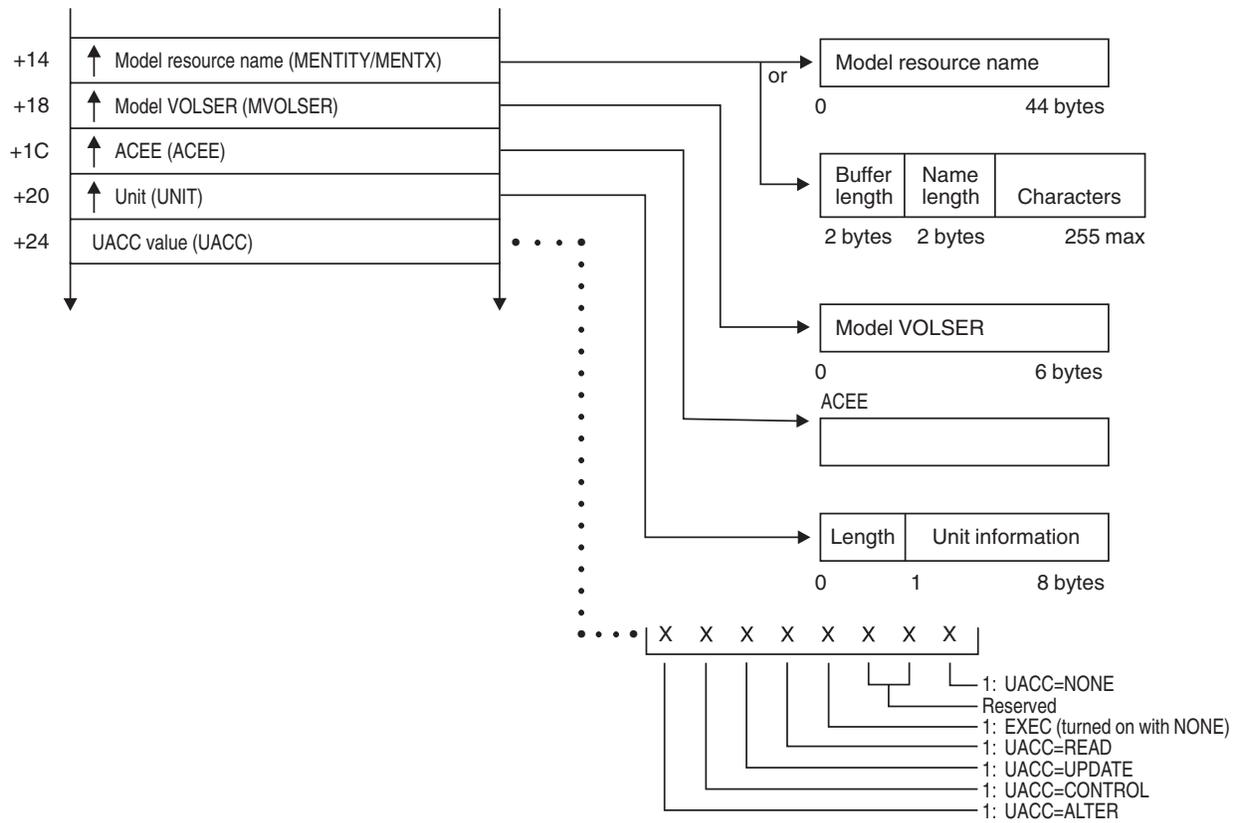
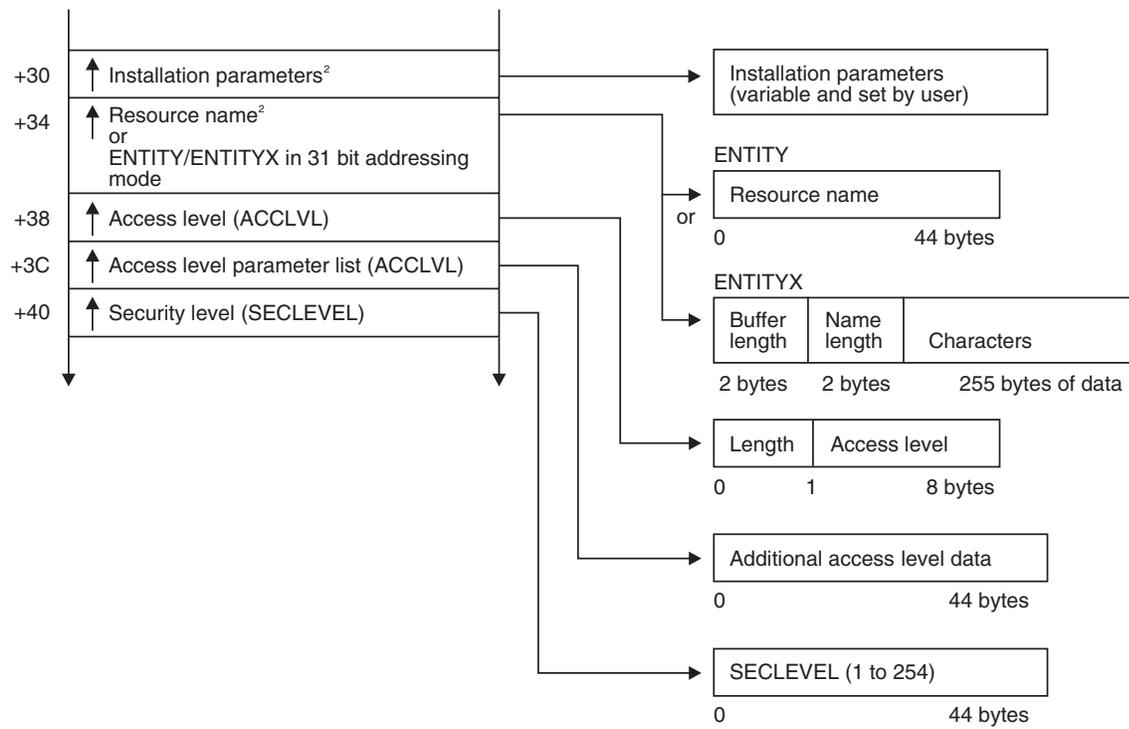


Figure 27. DEFINE Service Parameter List (Part 2 of 6)

DEFINE parameters



² This field is zero if bit 4 of the flag byte at offset 4 is zero (input was RACDEF macro).

Figure 27. DEFINE Service Parameter List (Part 4 of 6)

DEFINE parameters

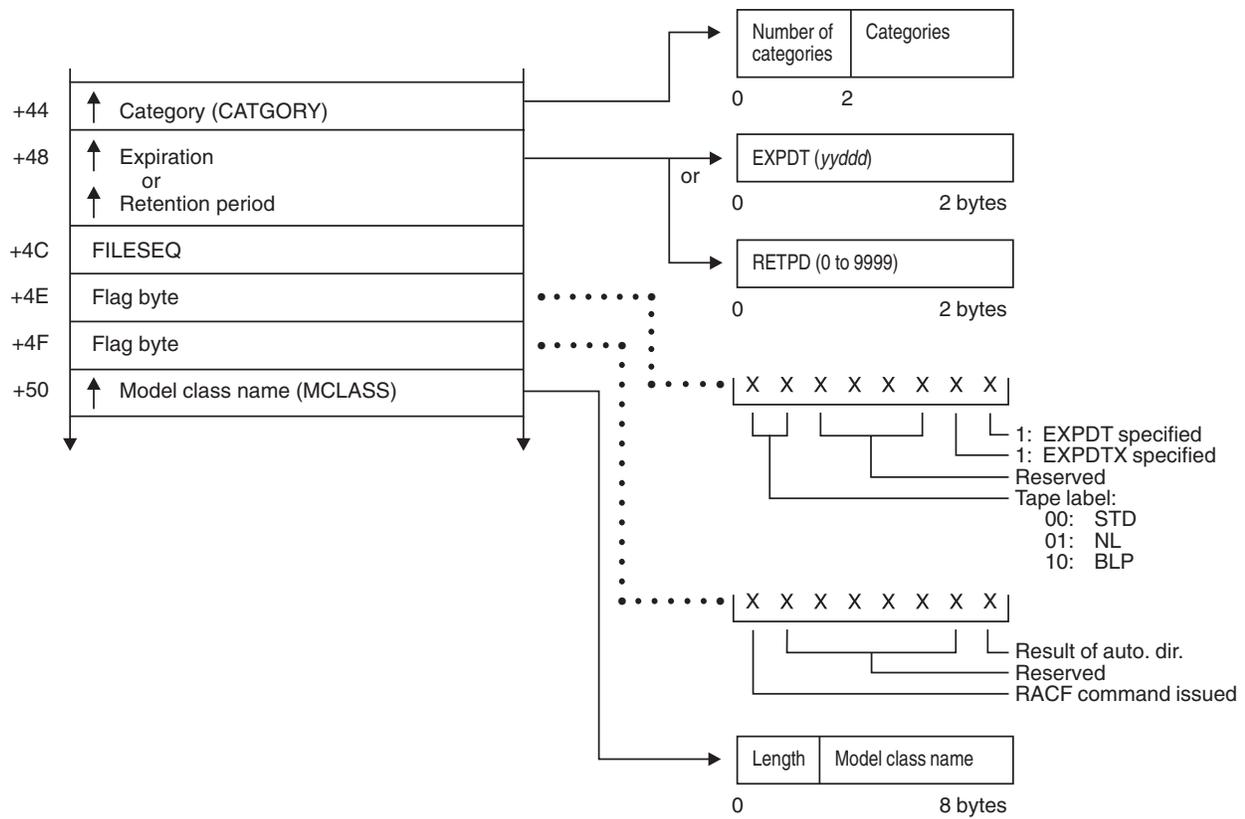


Figure 27. DEFINE Service Parameter List (Part 5 of 6)

DEFINE parameters

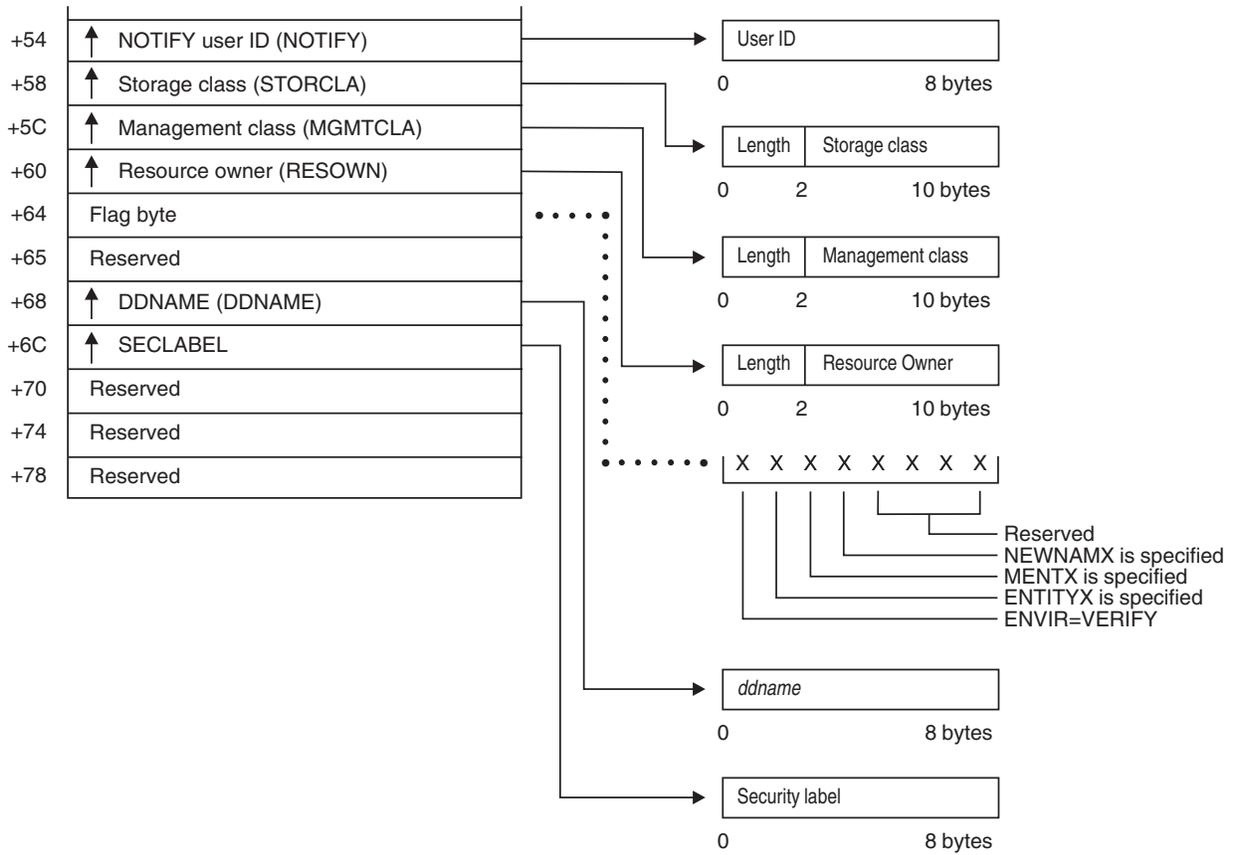


Figure 27. DEFINE Service Parameter List (Part 6 of 6)

DIRAUTH parameters

DIRAUTH Service Parameter List

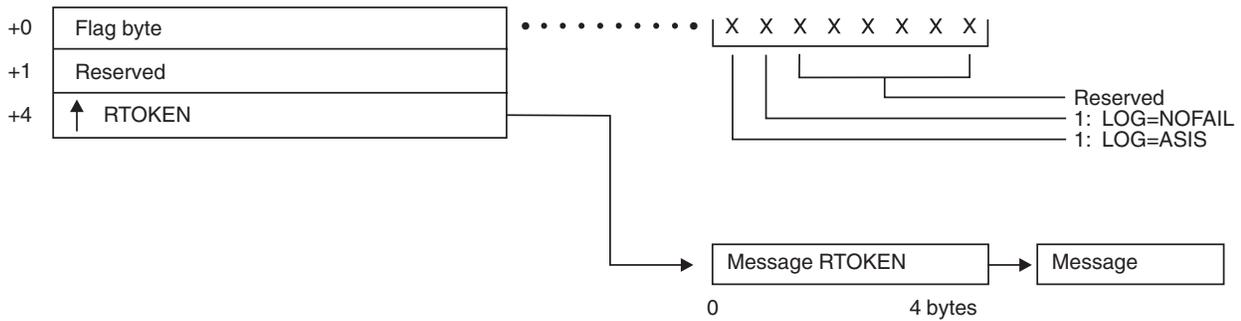


Figure 28. DIRAUTH Service Parameter List

EXTRACT service parameter list

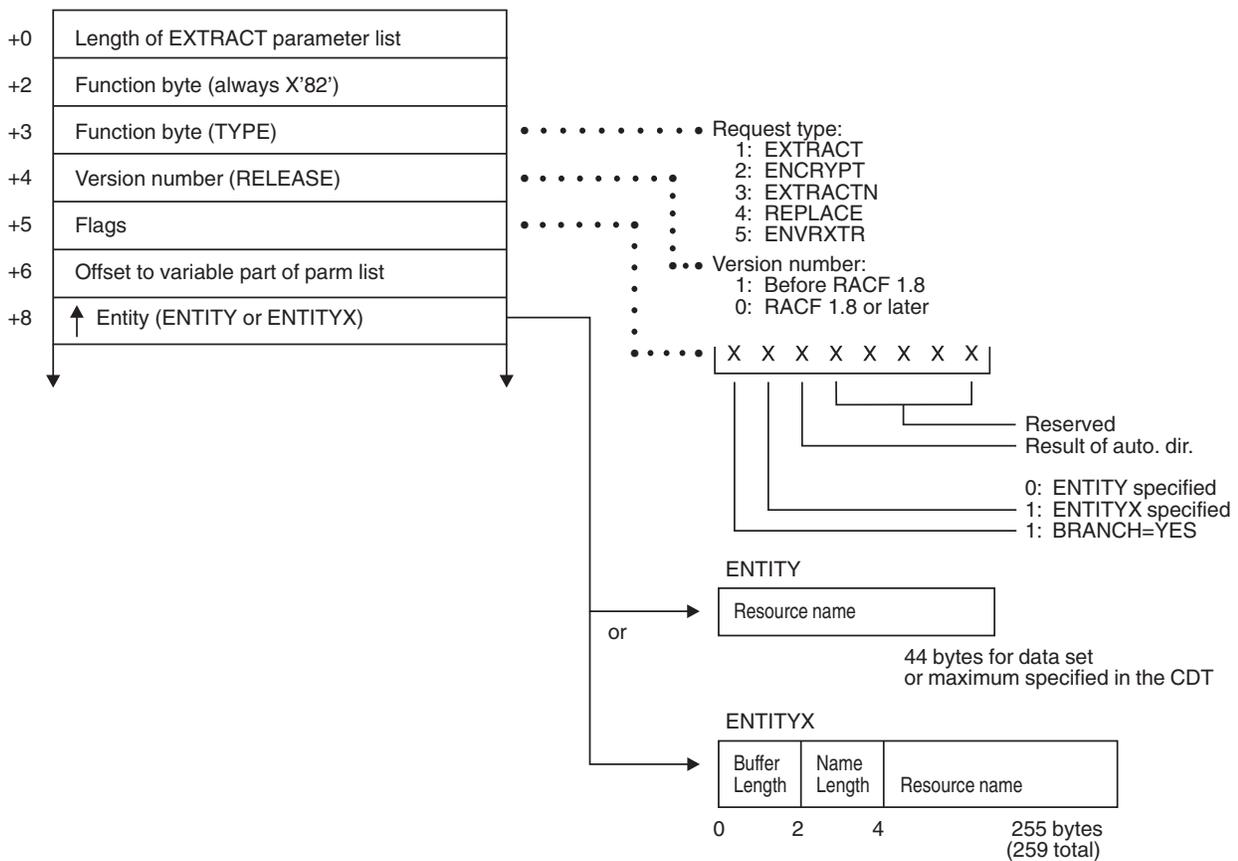


Figure 29. EXTRACT Service Parameter List (Part 1 of 3)

EXTRACT parameters

(The following is used when TYPE = ENVRXTR.)

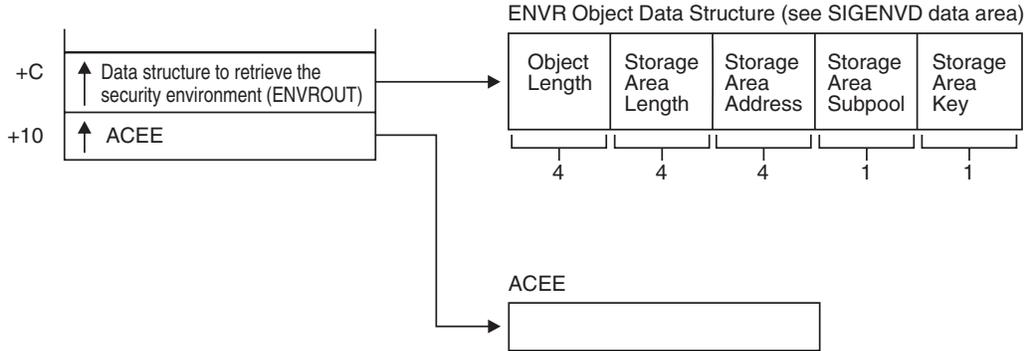
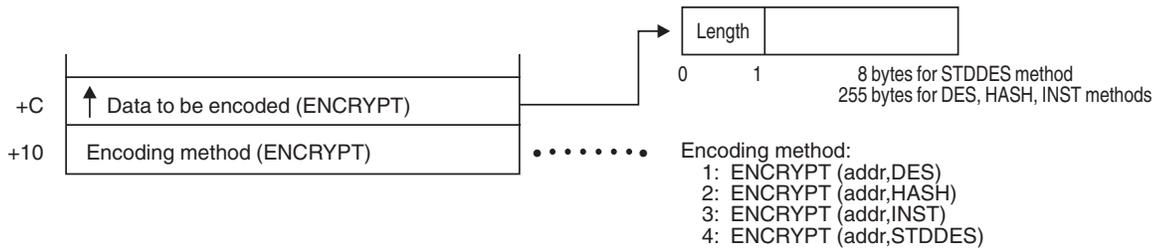


Figure 29. EXTRACT Service Parameter List (Part 2 of 3)

EXTRACT parameters

(The following is used when TYPE=ENCRYPT.)



(The following is used when TYPE is not ENCRYPT or ENVRXTR.)

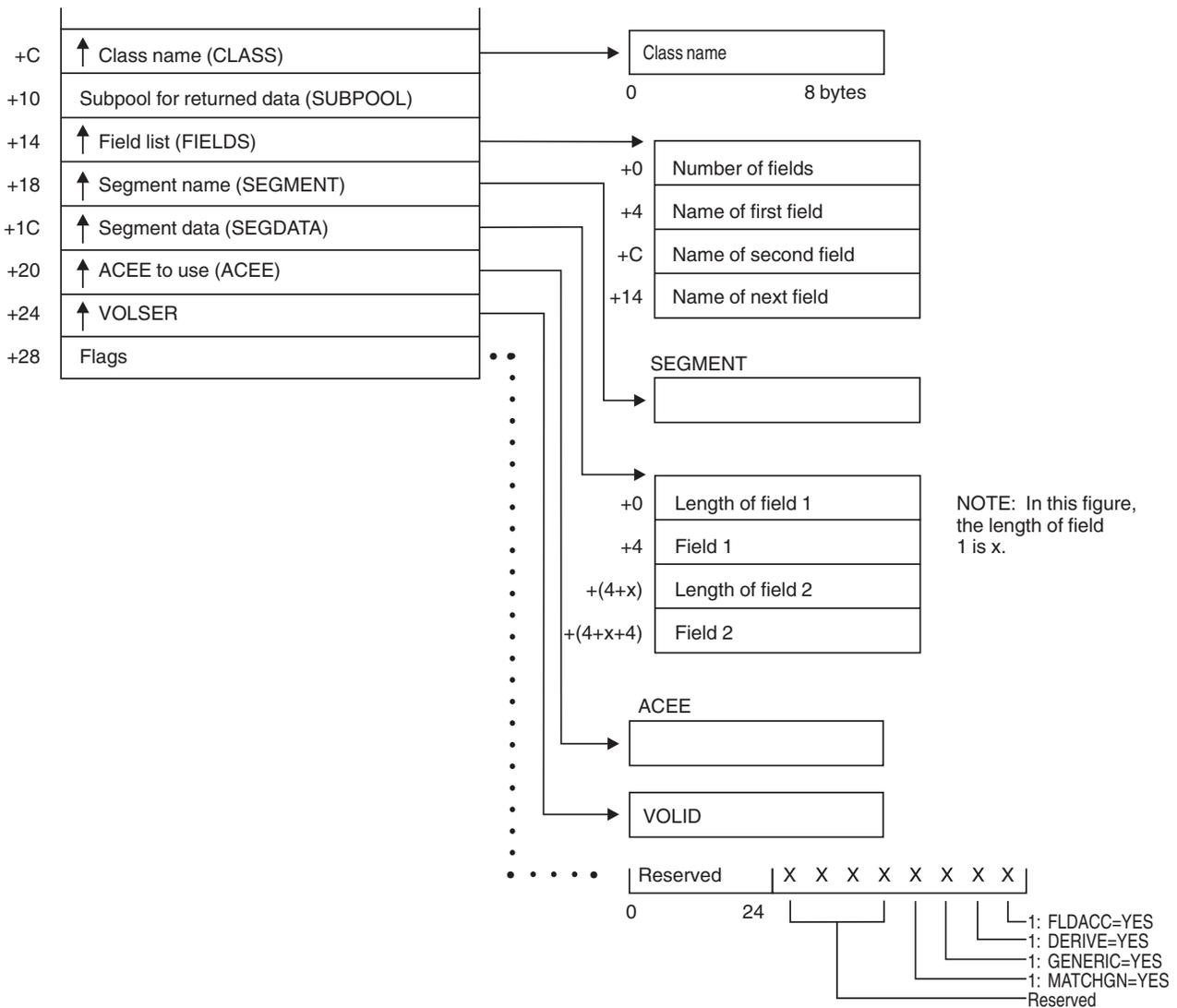


Figure 29. EXTRACT Service Parameter List (Part 3 of 3)

FASTAUTH service parameter list

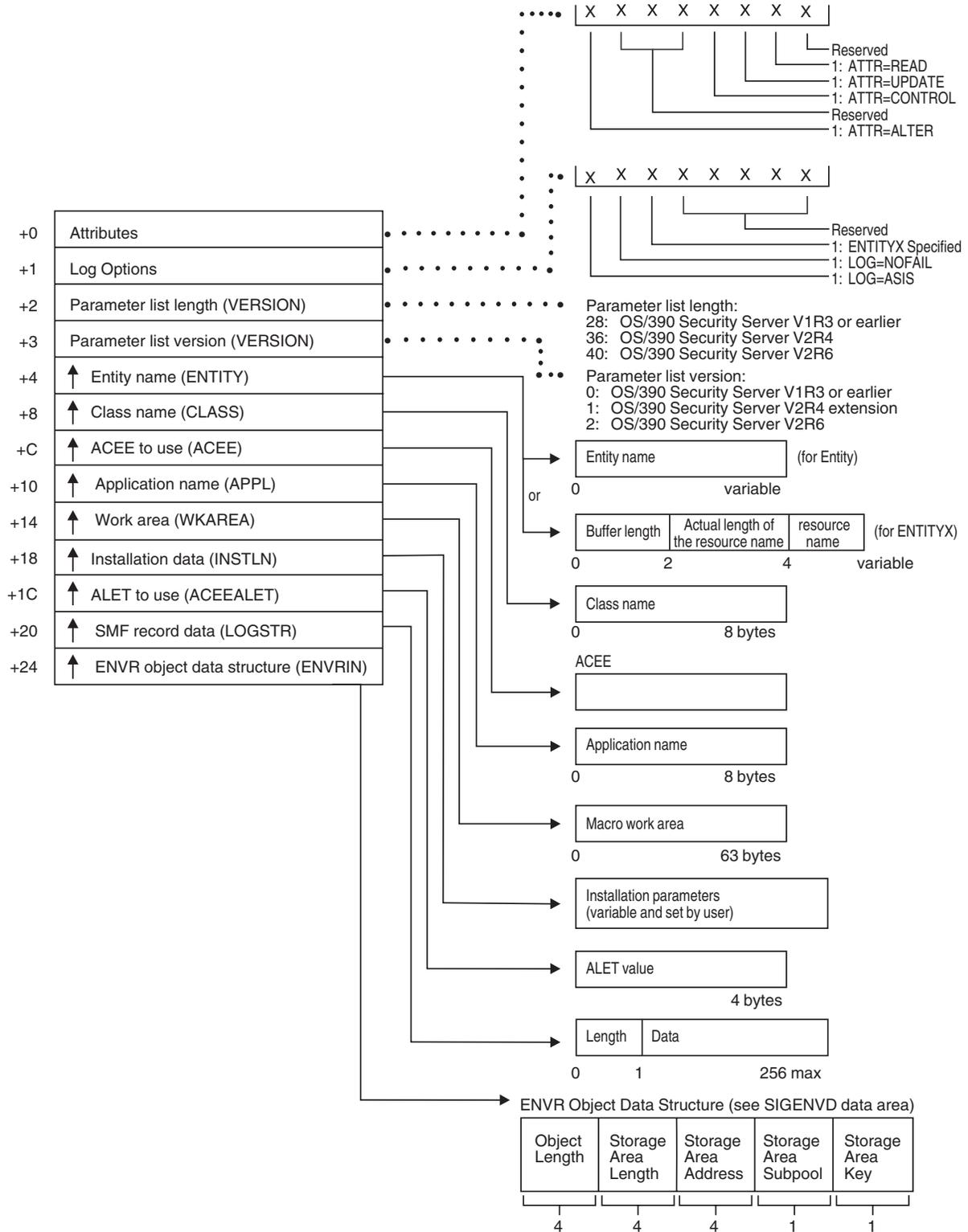


Figure 30. FASTAUTH Service Parameter List

LIST parameters

LIST service parameter list

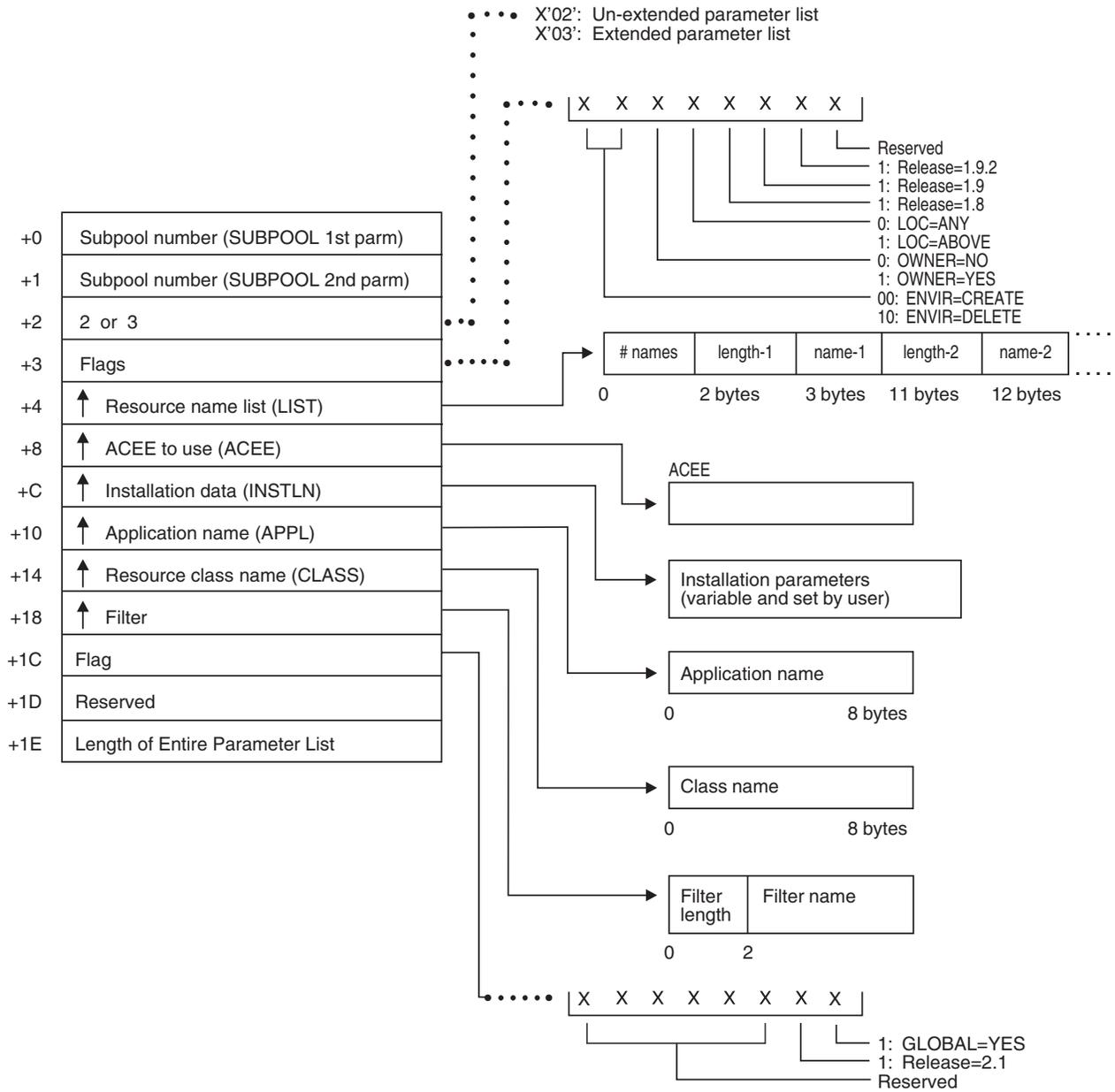


Figure 31. LIST Service Parameter List

SIGNON service parameter list

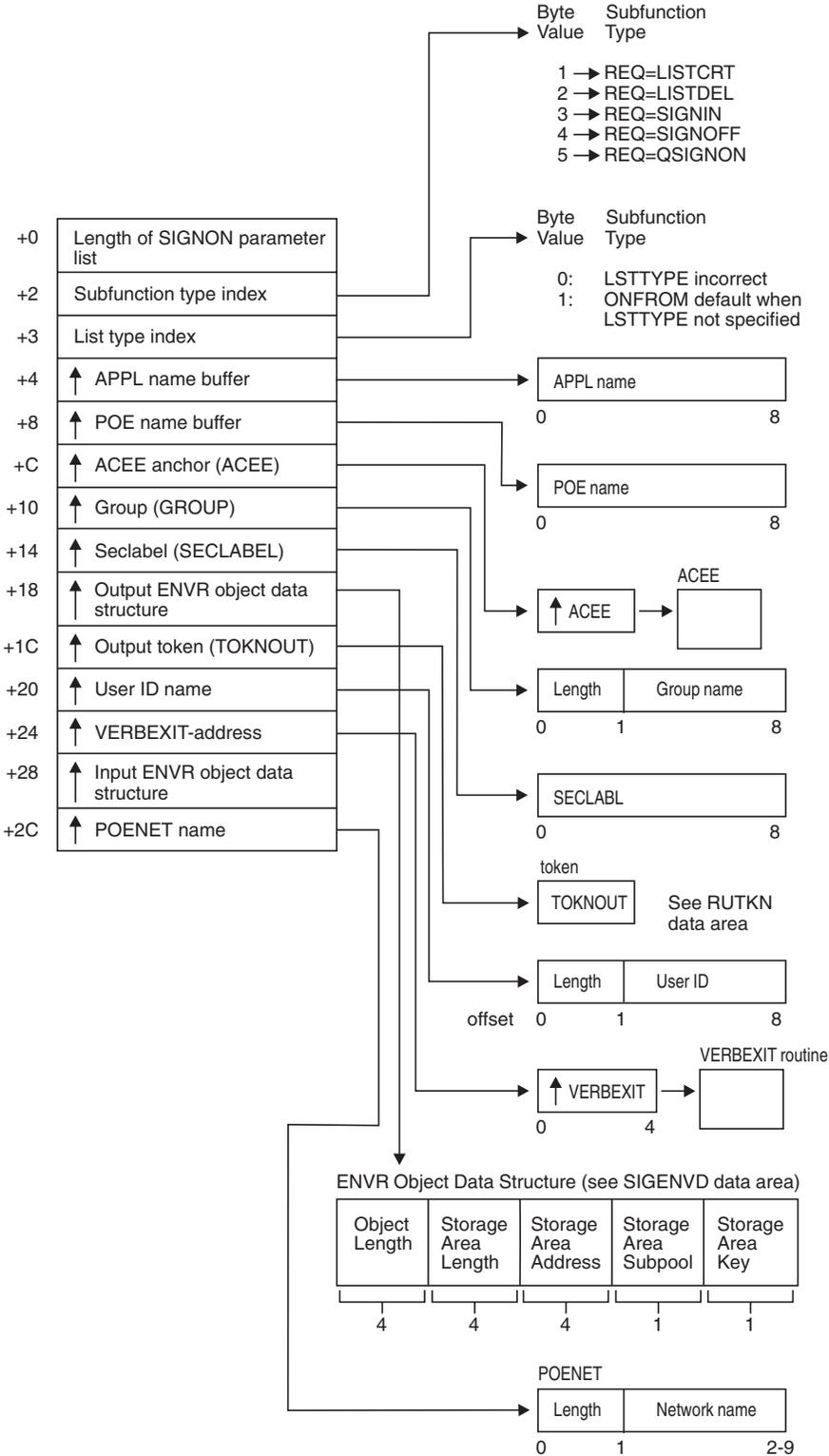


Figure 32. SIGNON Service Parameter List

STAT parameters

STAT service parameter list

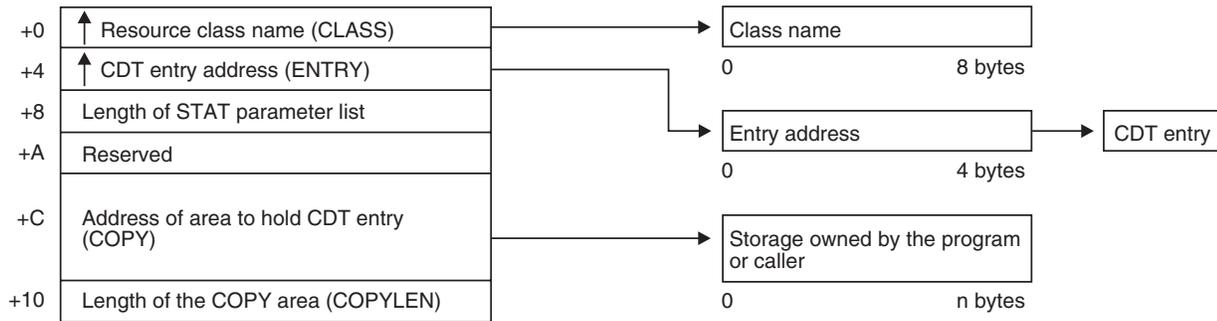


Figure 33. STAT Service Parameter List

TOKENBLD service parameter list

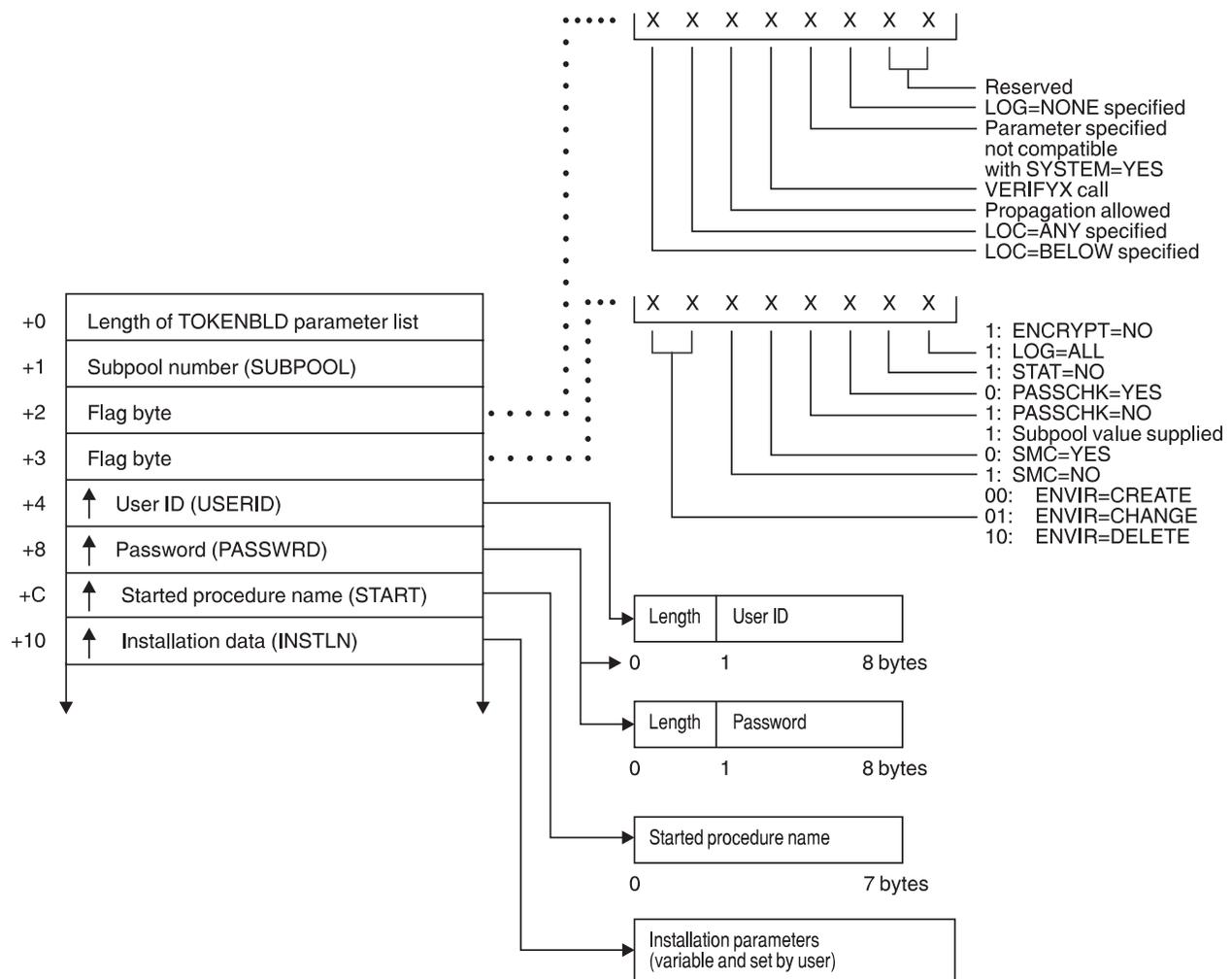


Figure 34. TOKENBLD Service Parameter List (Part 1 of 4)

TOKENBLD parameters

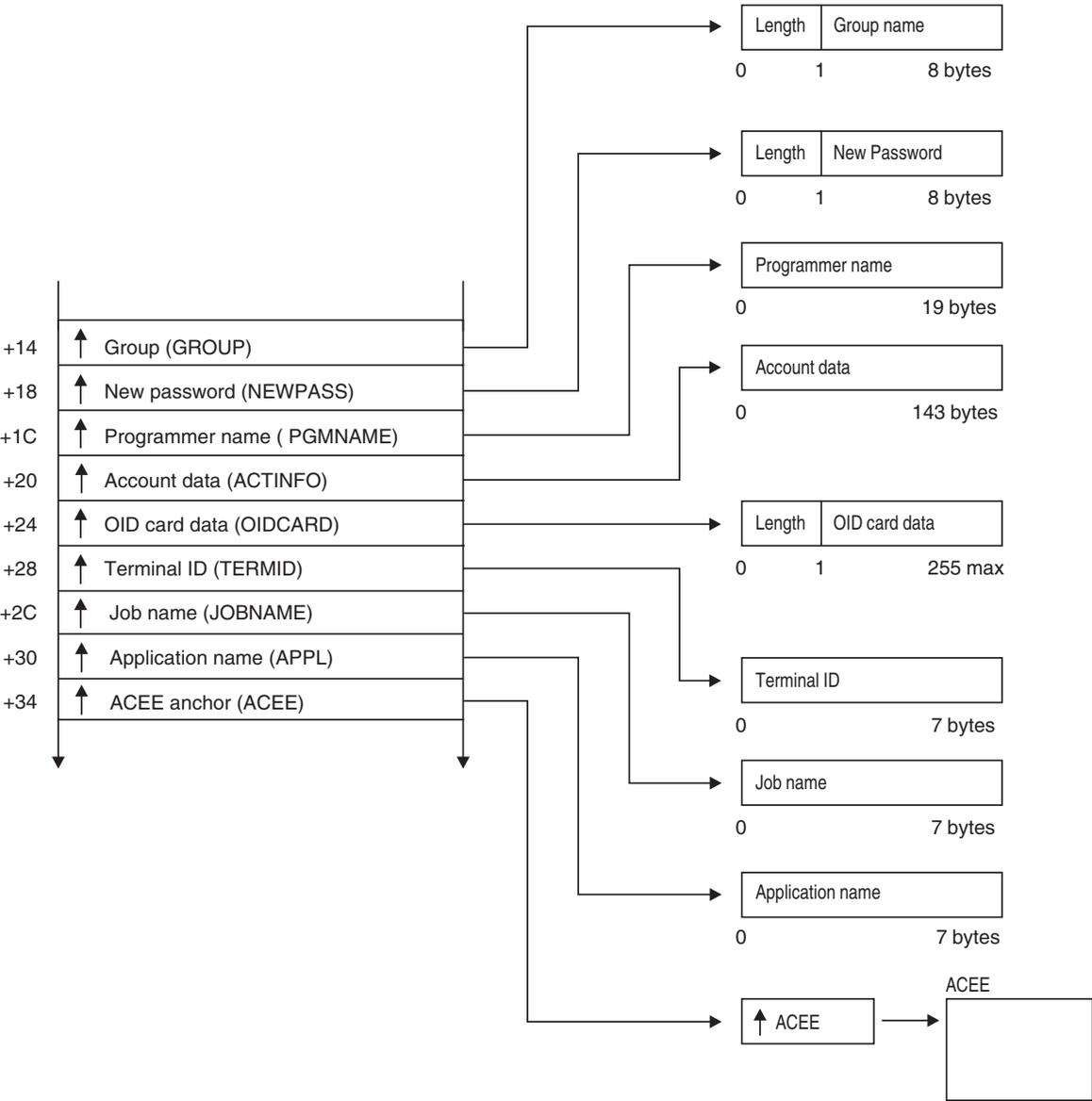


Figure 34. TOKENBLD Service Parameter List (Part 2 of 4)

TOKENBLD parameters

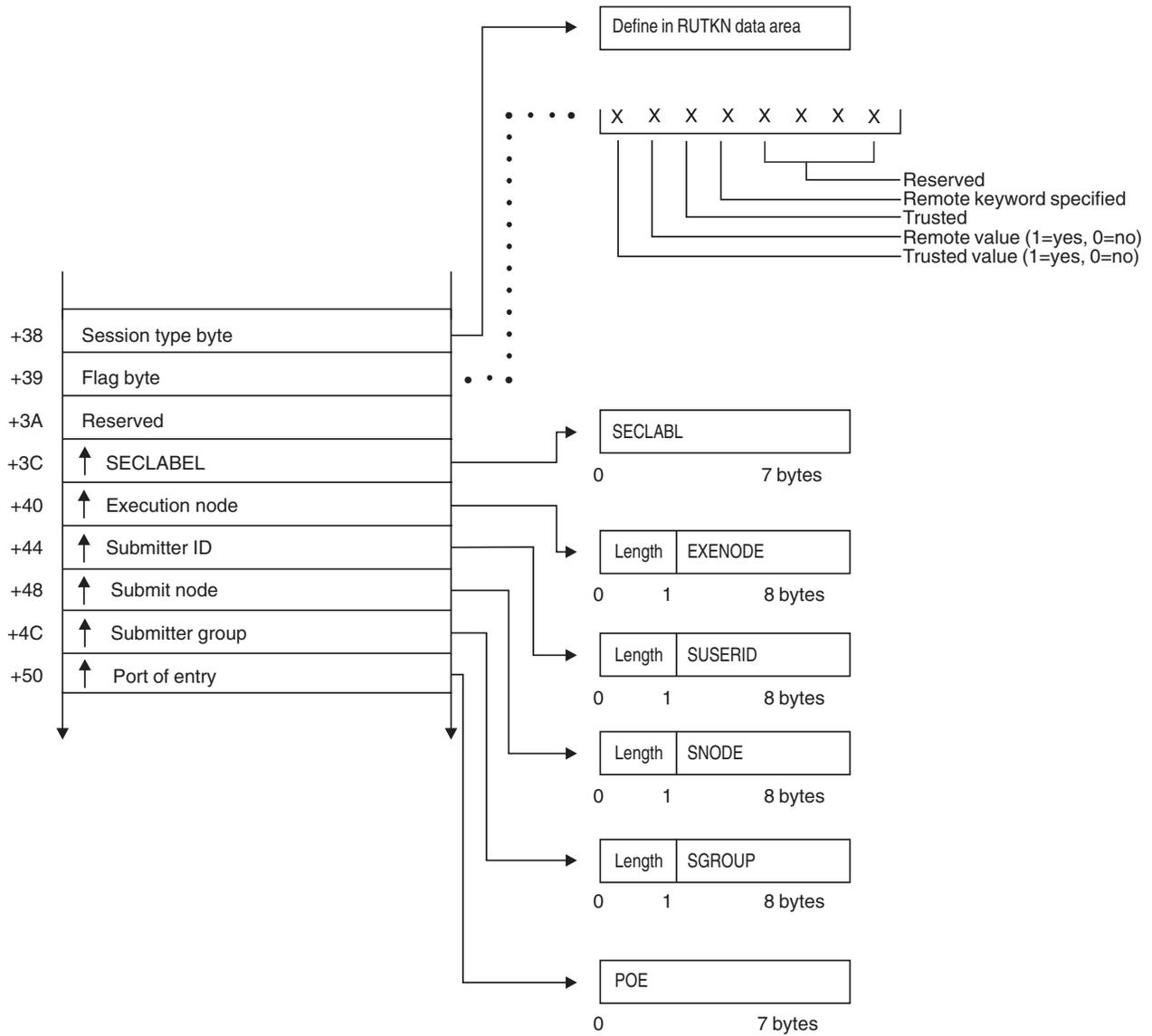


Figure 34. TOKENBLD Service Parameter List (Part 3 of 4)

TOKENBLD parameters

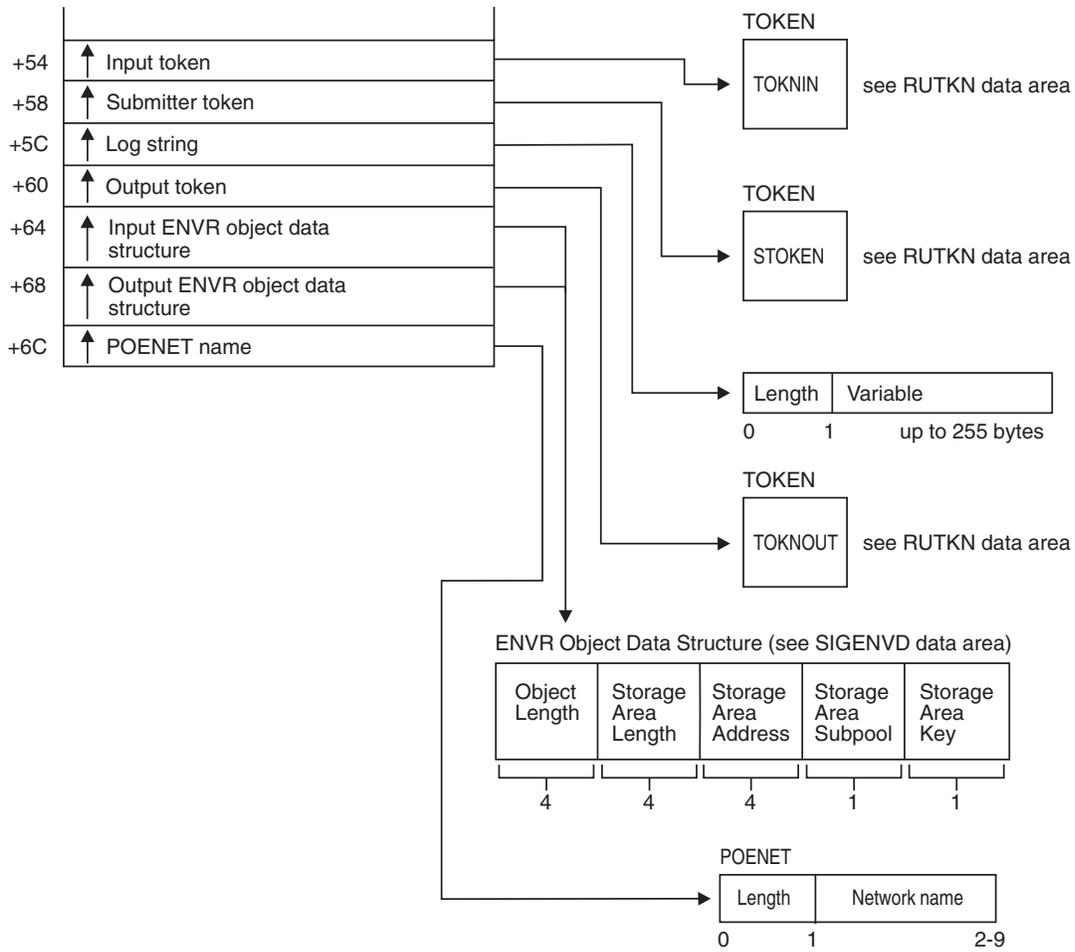


Figure 34. TOKENBLD Service Parameter List (Part 4 of 4)

TOKENMAP/TOKENXTR parameters

TOKENMAP/TOKENXTR service parameter list

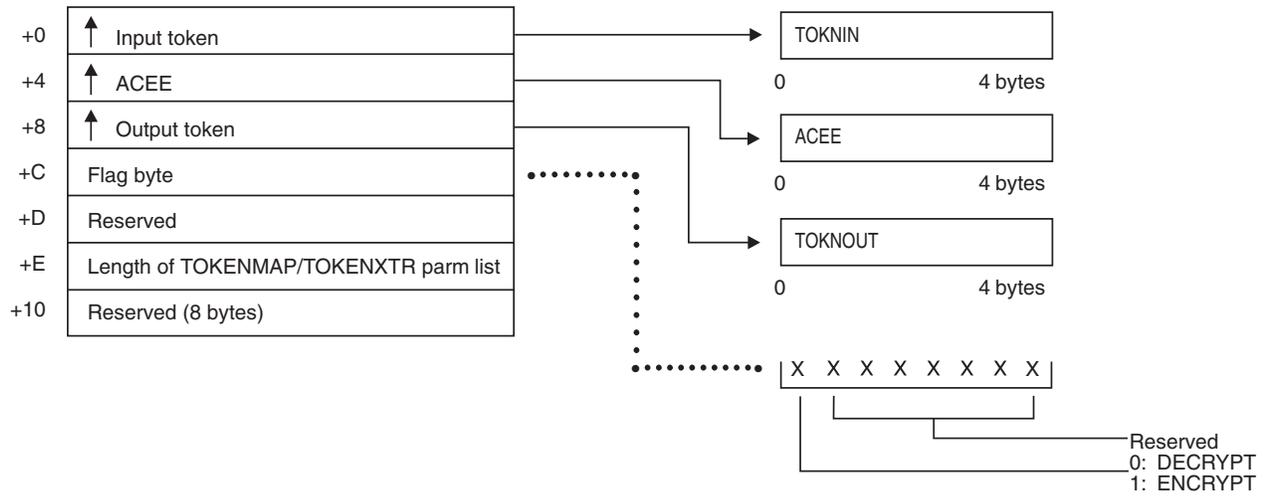


Figure 35. TOKENMAP/TOKENXTR Service Parameter List

VERIFY/VERIFYX service parameter list

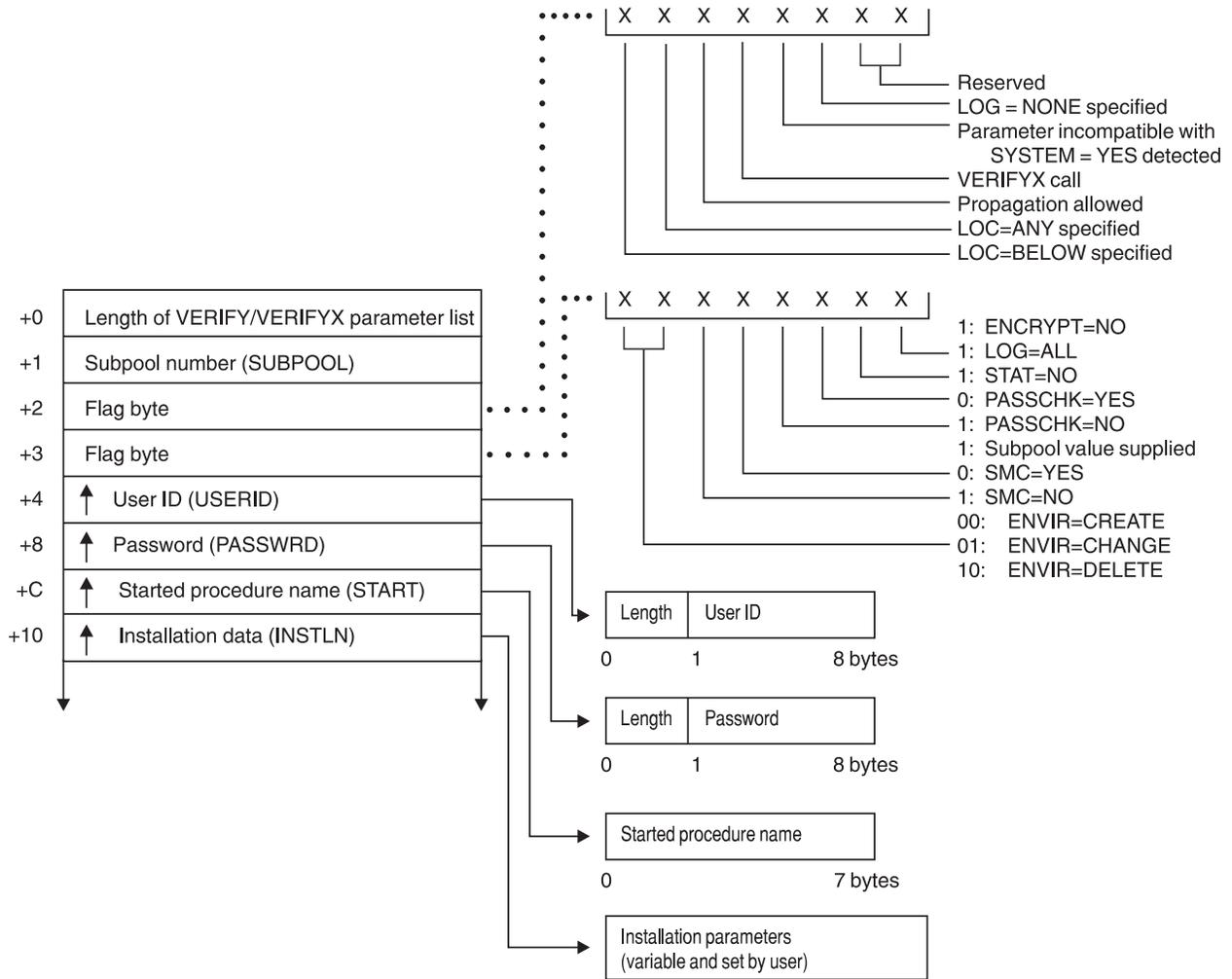


Figure 36. VERIFY/VERIFYX Service Parameter List (Part 1 of 4)

VERIFY/VERIFYX parameters

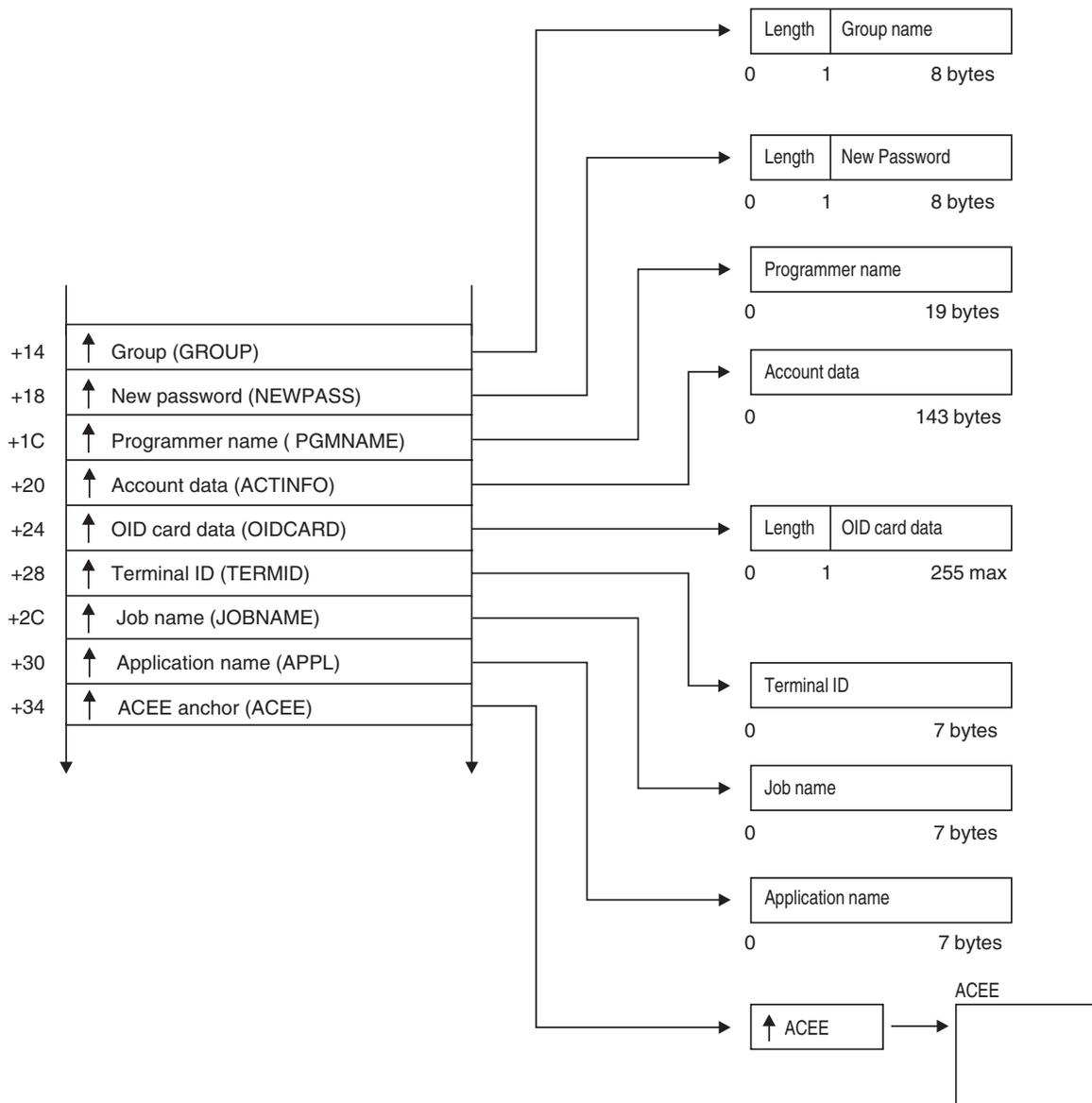


Figure 36. VERIFY/VERIFYX Service Parameter List (Part 2 of 4)

VERIFY/VERIFYX parameters

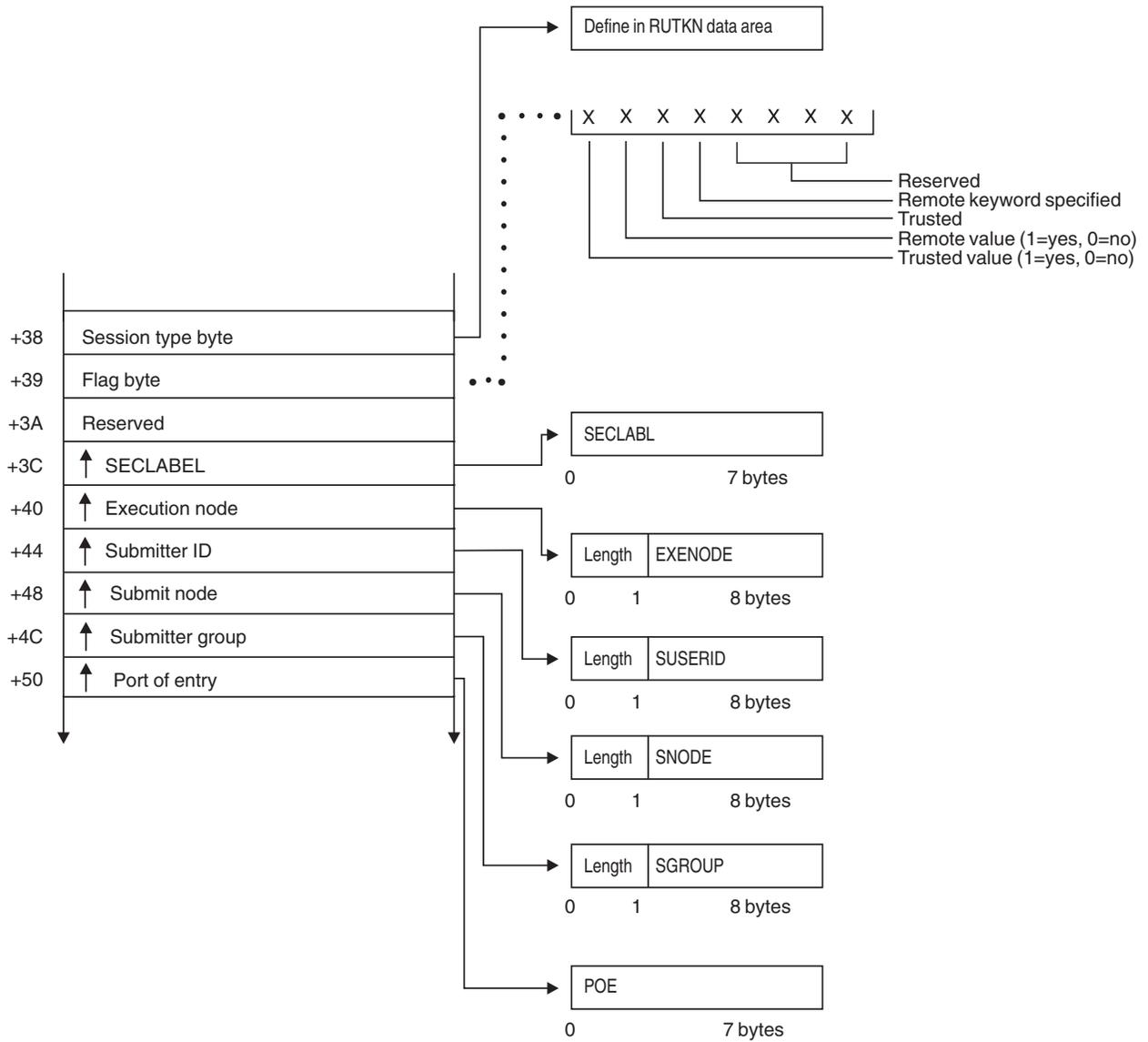


Figure 36. VERIFY/VERIFYX Service Parameter List (Part 3 of 4)

VERIFY/VERIFYX parameters

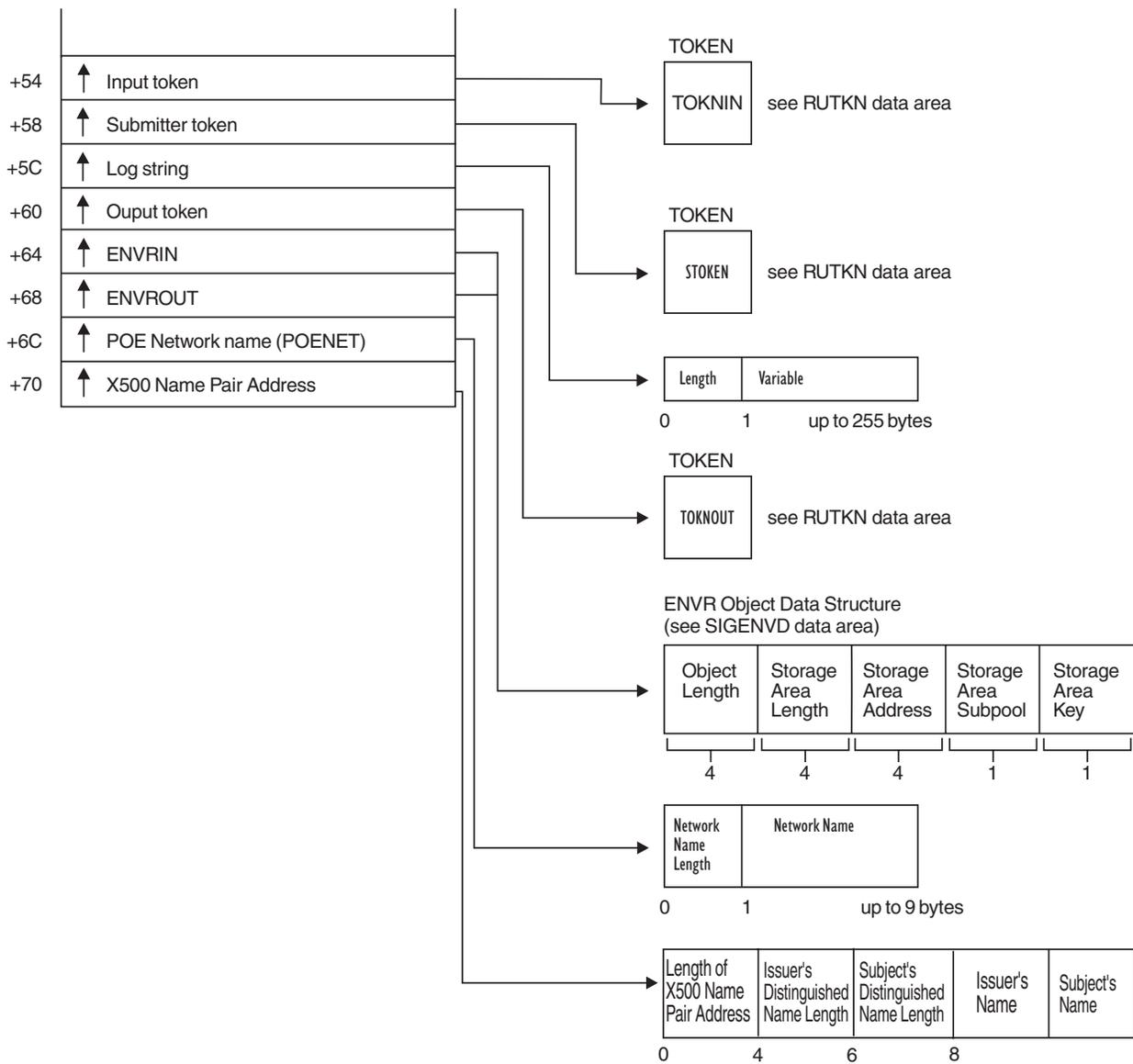


Figure 36. VERIFY/VERIFYX Service Parameter List (Part 4 of 4)

ICHEINTY parameter list

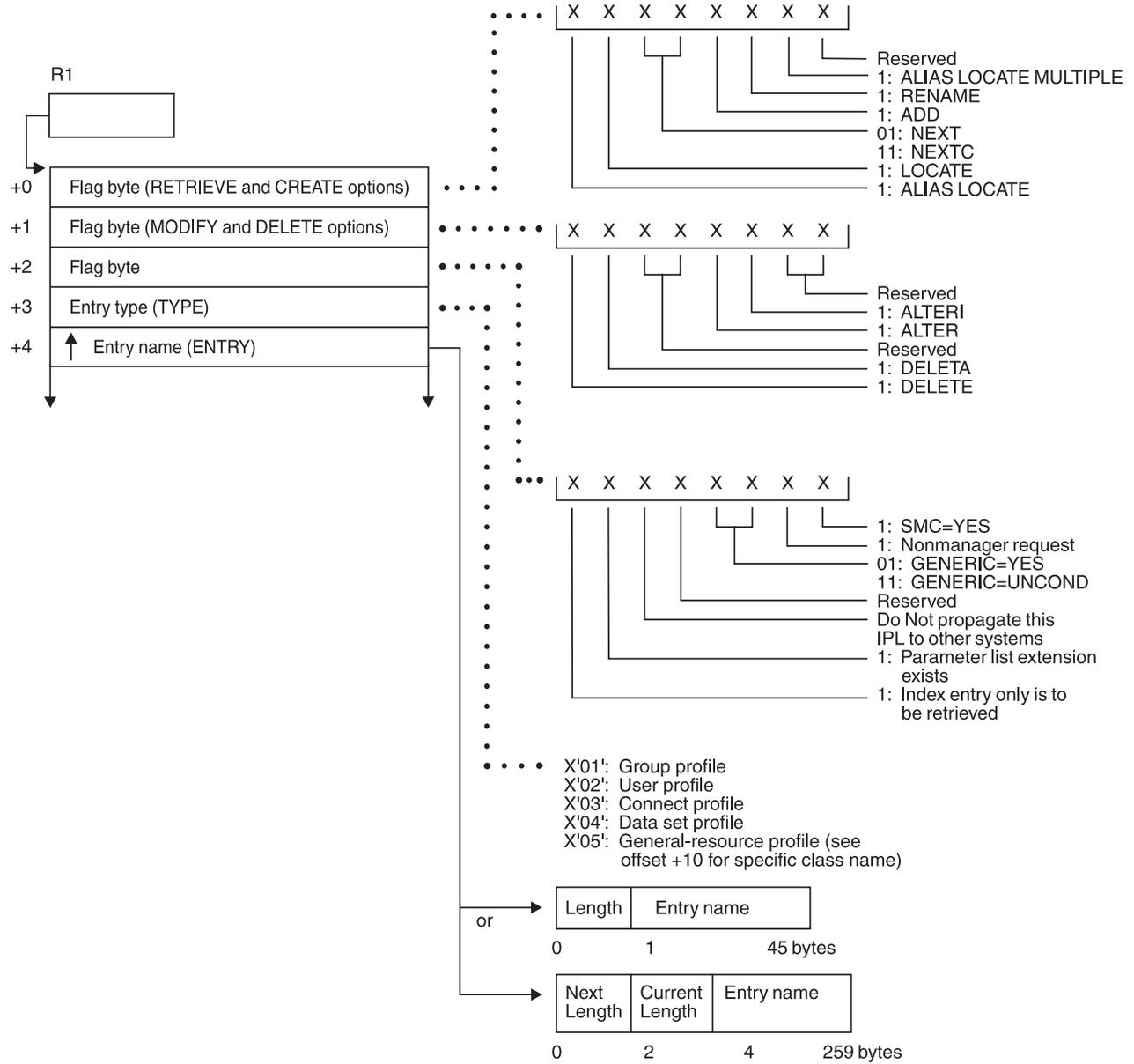
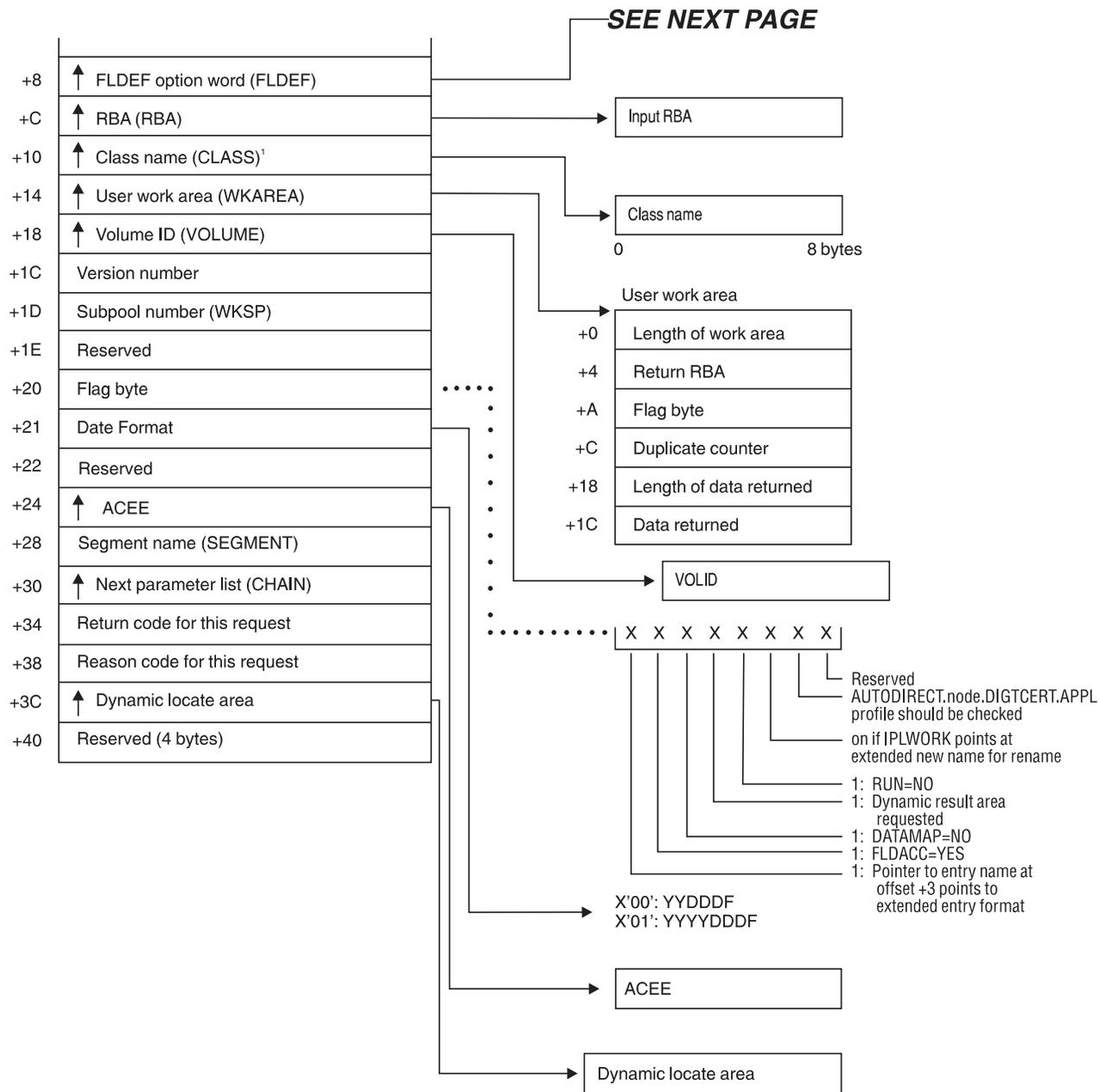


Figure 37. ICHEINTY Parameter List (Part 1 of 3)

ICHEINTY parameters



¹ This field has a value only when the byte at +3 (entry type) has a value of X'05'.

Figure 37. ICHEINTY Parameter List (Part 2 of 3)

ICHEINTY parameters

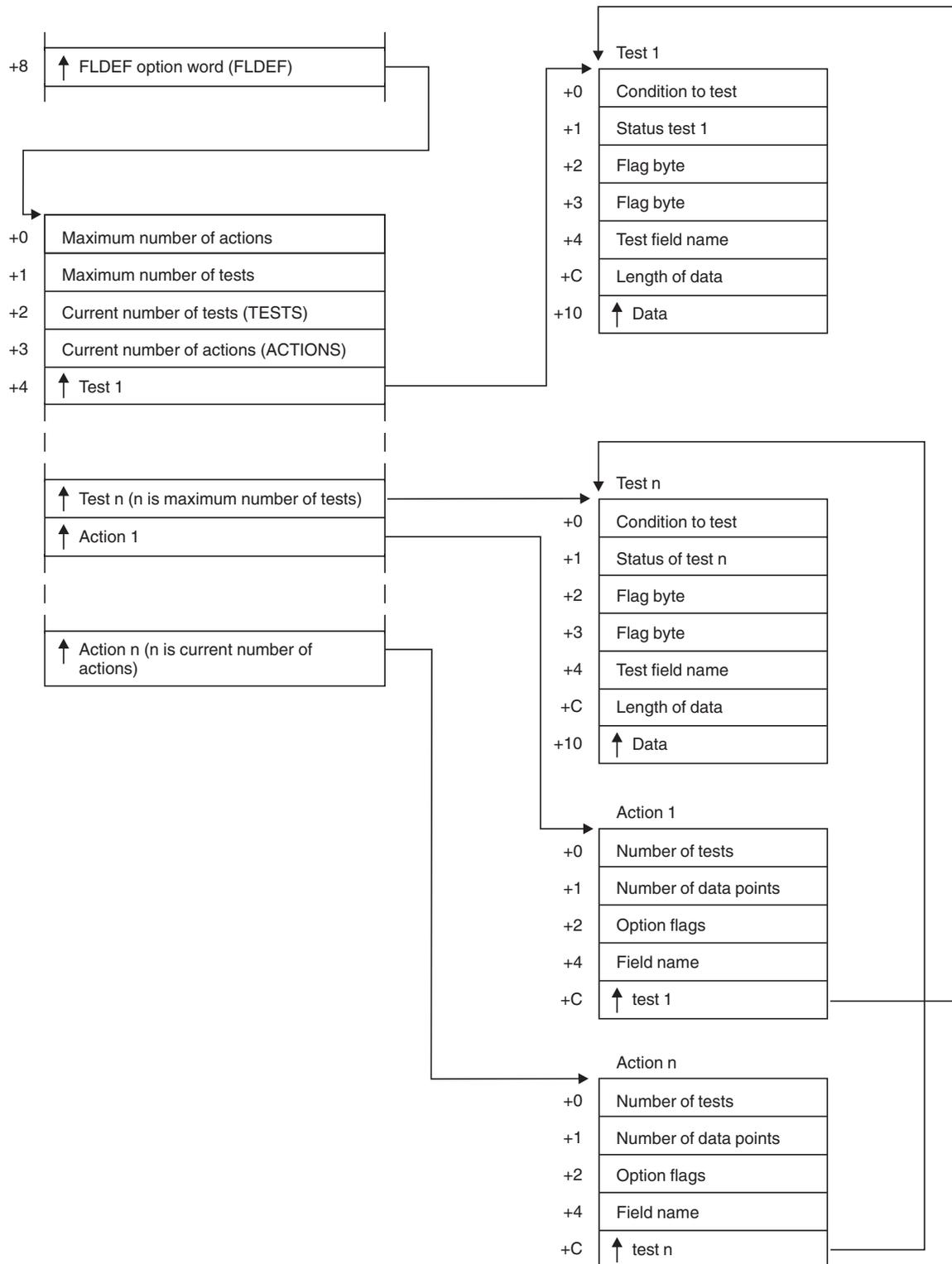


Figure 37. ICHEINTY Parameter List (Part 3 of 3)

Process flows for RACF

This section provide process flows for:

- Commands
- Directed commands
- Macros
- Installation exits
- Utilities
- The report writer
- The SMF data unload utility
- IMS use of RACF
- Callable services

Process flow for RACF commands

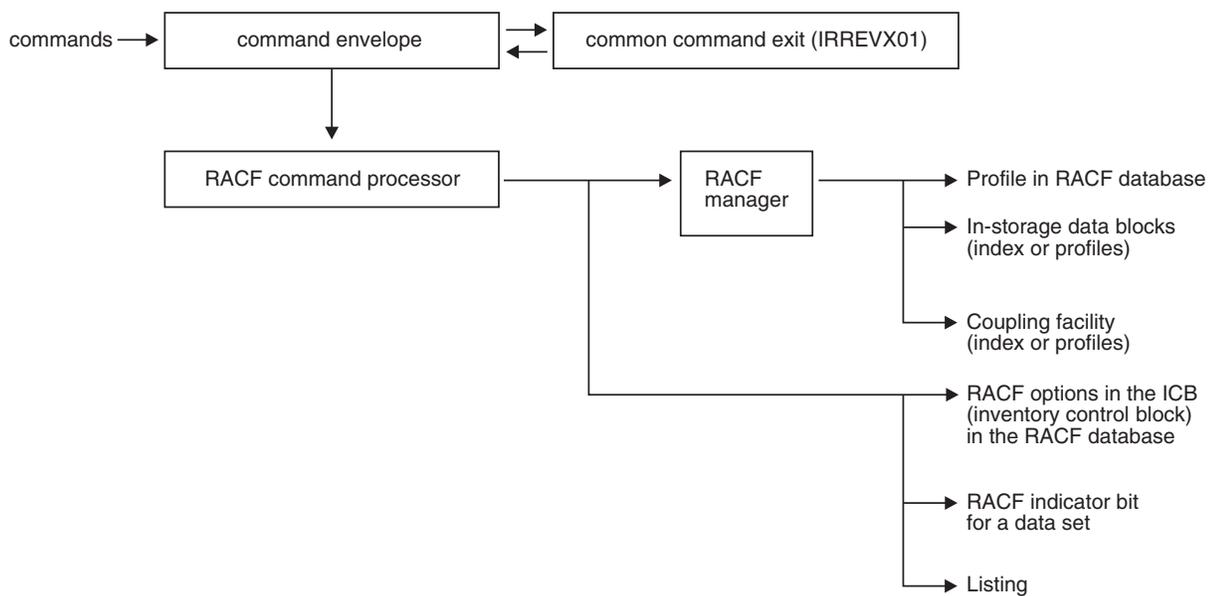


Figure 38. Process Flow for RACF Commands

Process flow for RACF directed commands

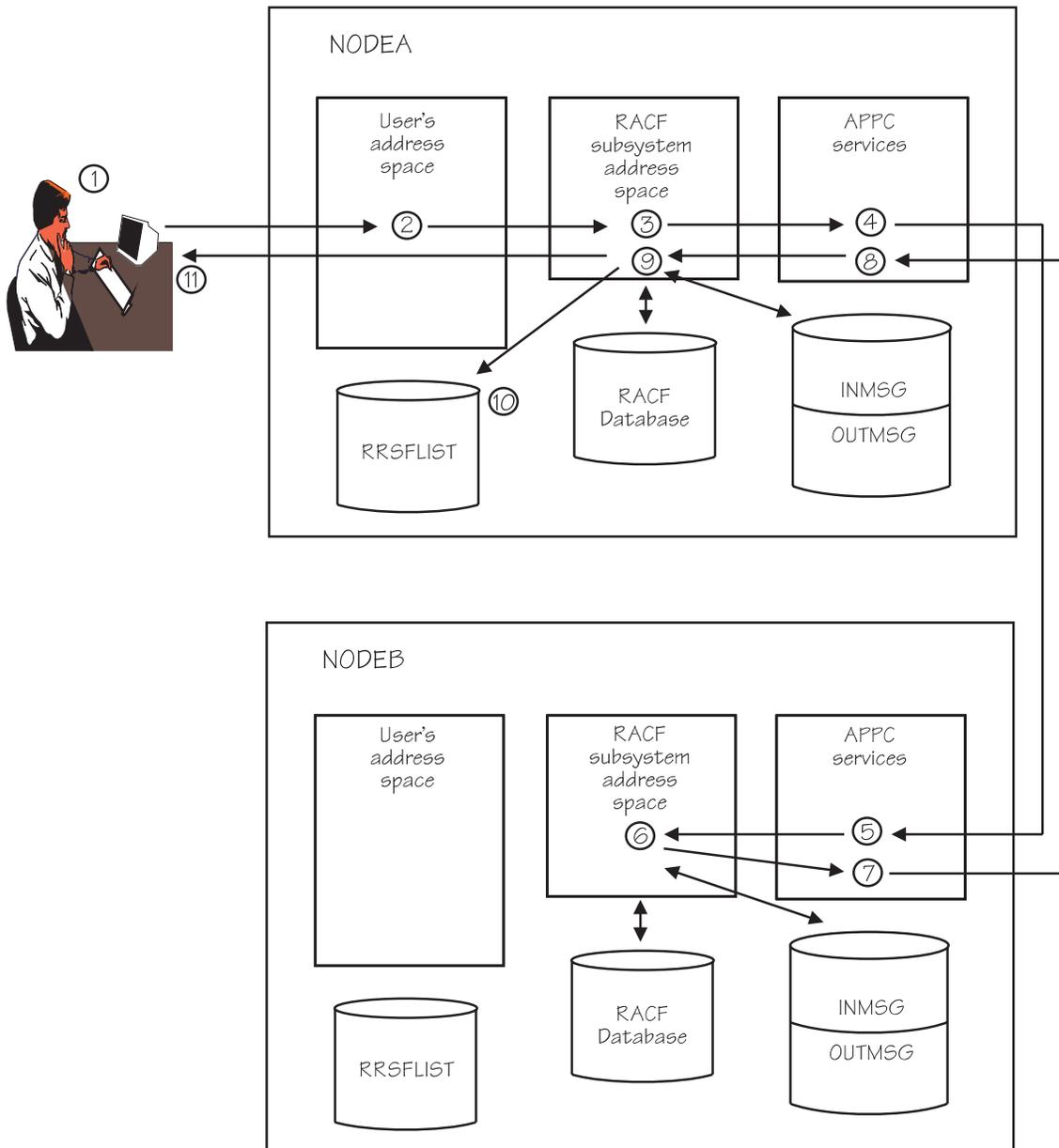


Figure 39. Process Flow for RACF Directed Commands

Process flows

Process flow for RACF macros

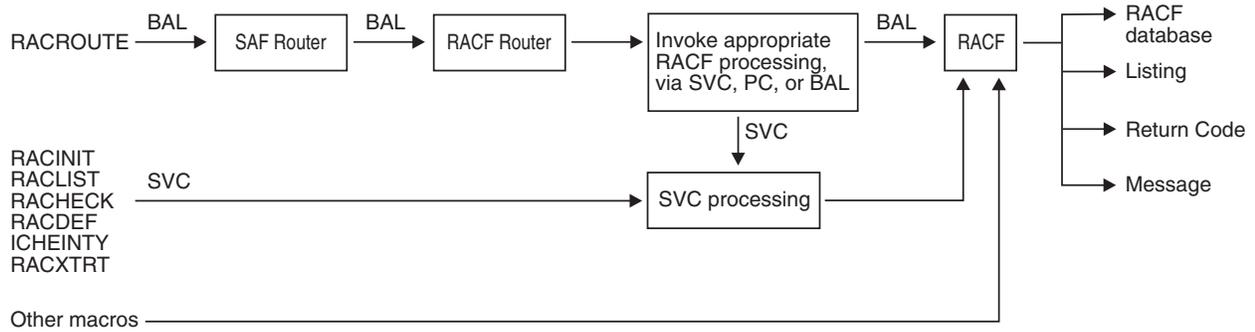


Figure 40. Process Flow for RACF Macros

Process flow for RACF installation exits

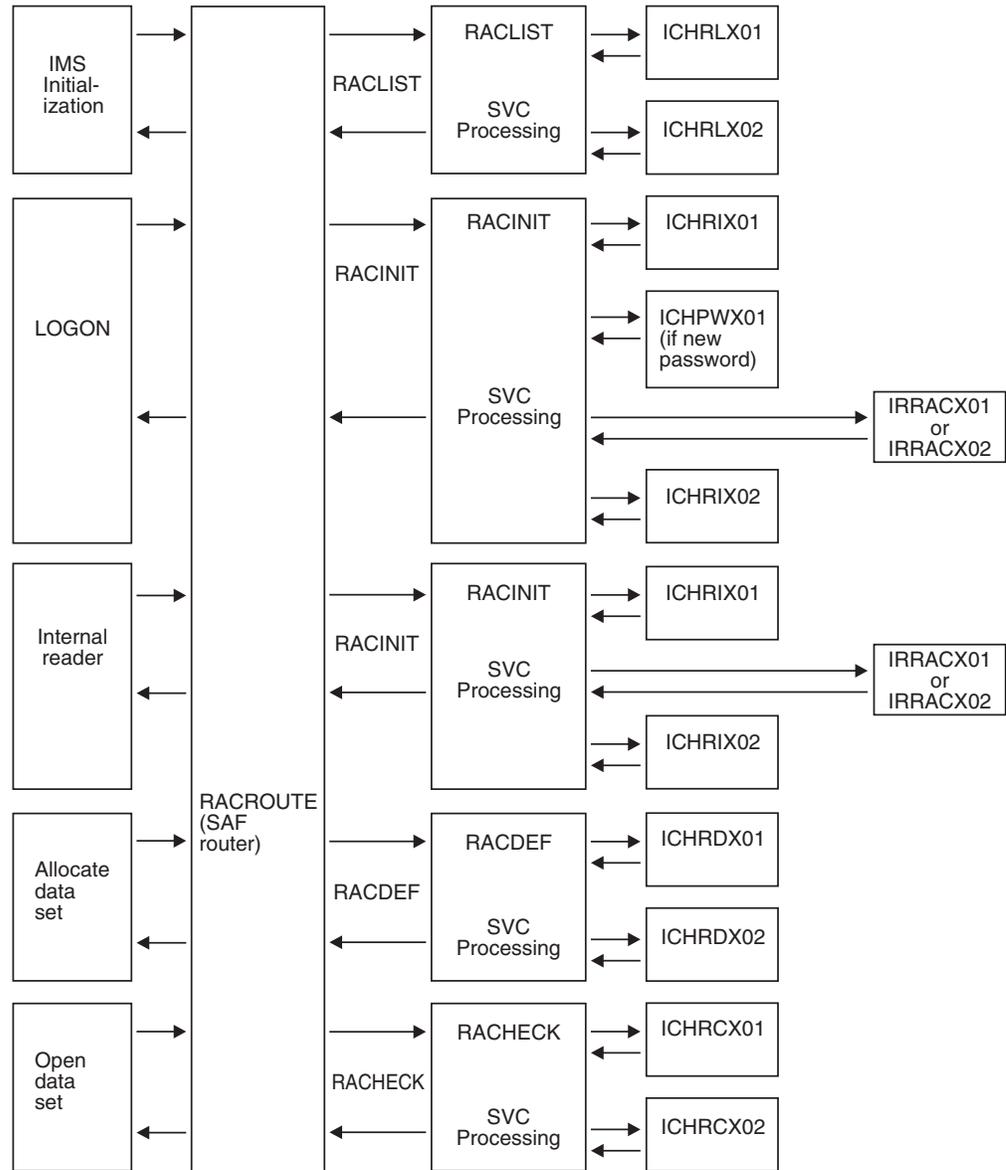


Figure 41. Process Flow for RACF Installation Exits (Part 1 of 2)

Process flows

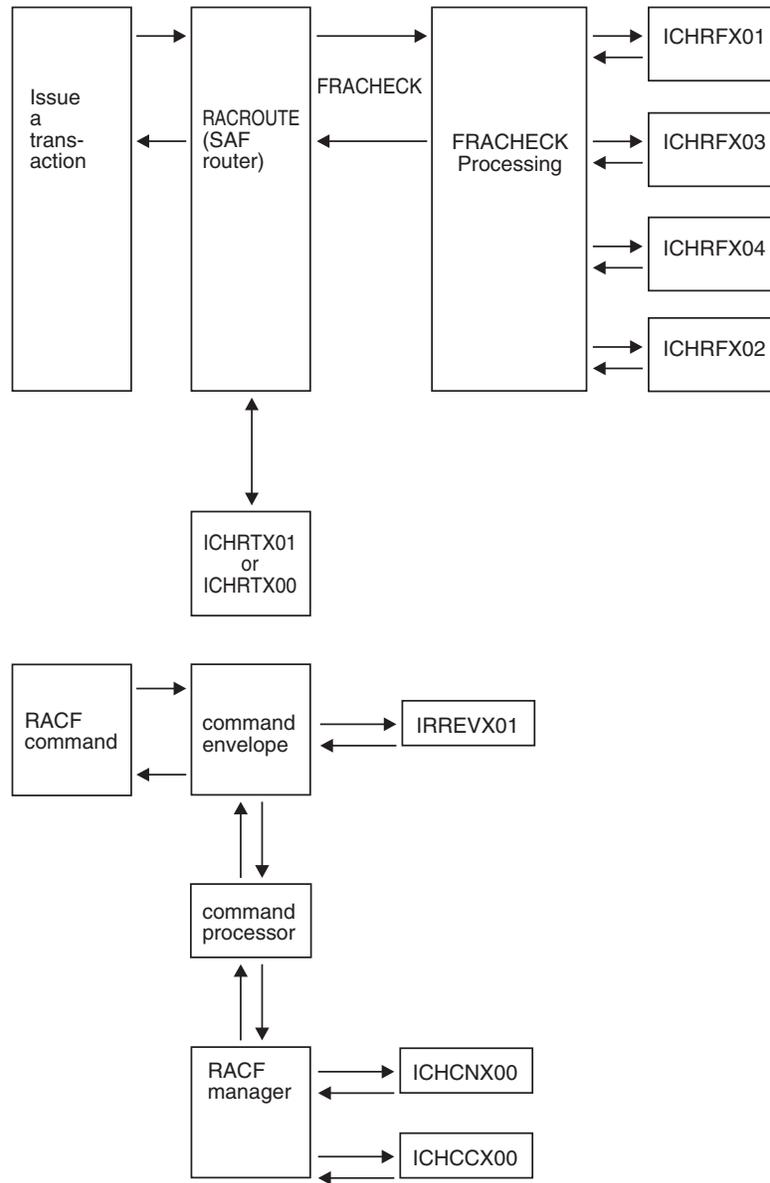


Figure 41. Process Flow for RACF Installation Exits (Part 2 of 2)

Process flow for RACF utilities

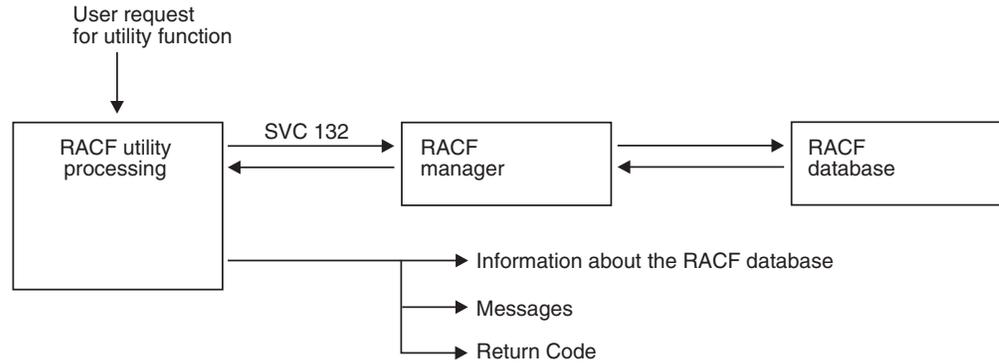


Figure 42. Process Flow for RACF Cross-Reference and Database Unload Utilities

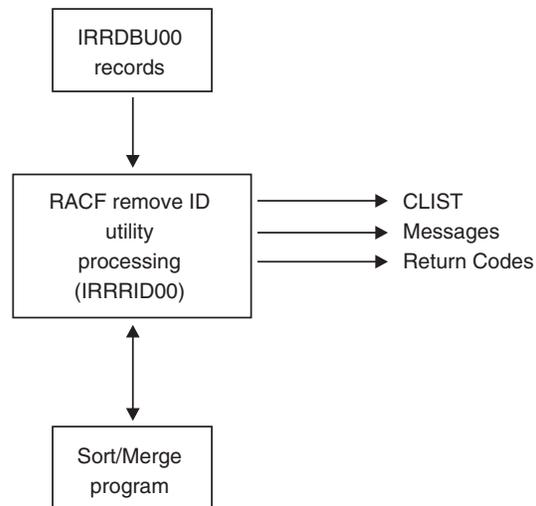


Figure 43. Process Flow for RACF Remove ID Utility

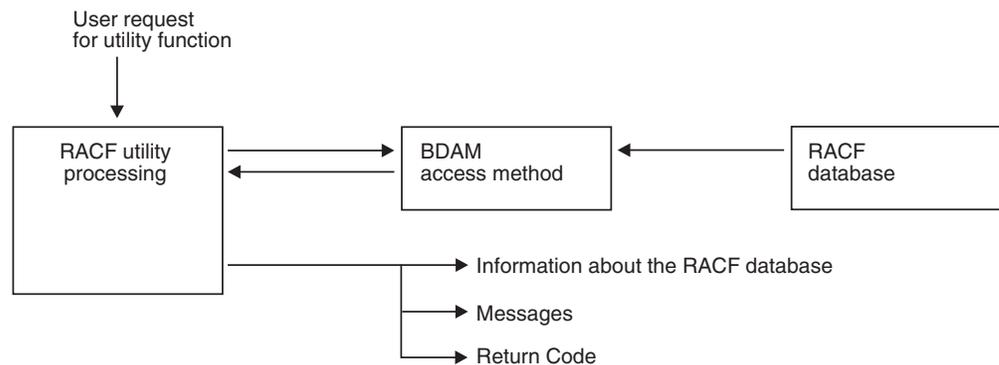


Figure 44. Process Flow for Other RACF Utilities

Process flows

Process flow for the RACF Report Writer

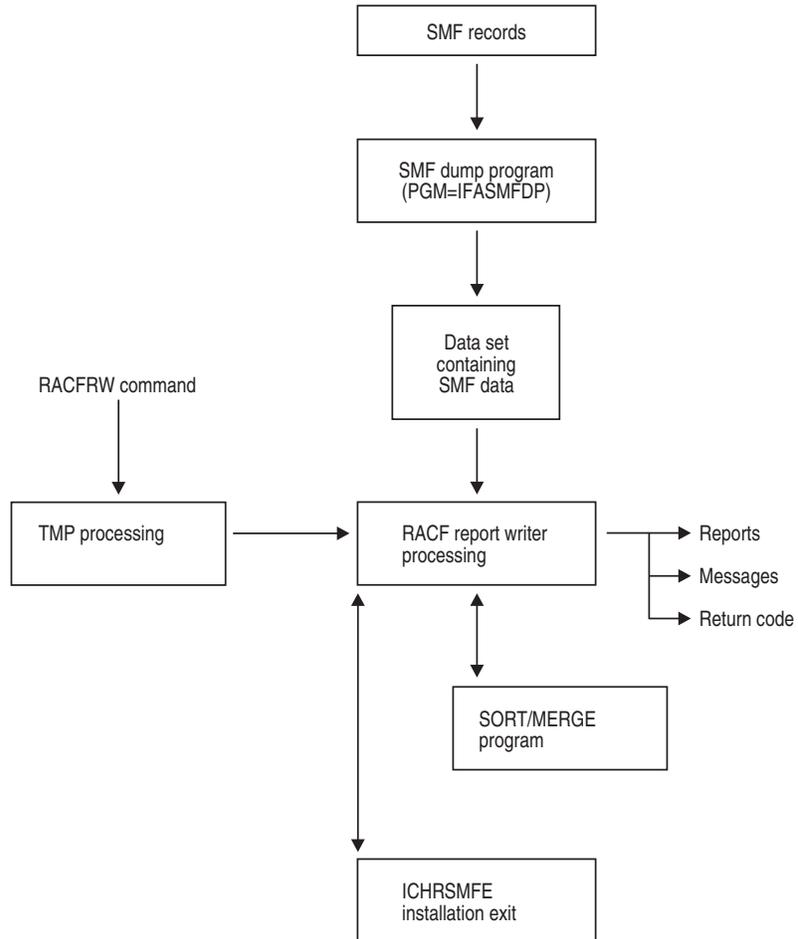


Figure 45. Process Flow for RACF Report Writer

Process flow for SMF Data Unload Utility (IRRADU00)

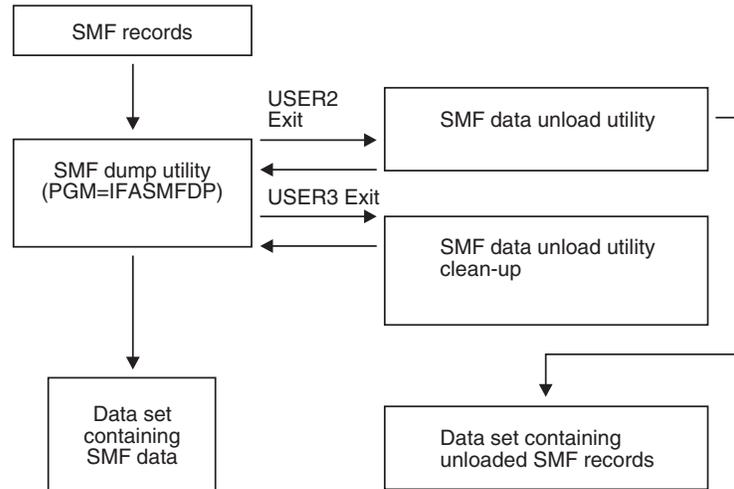


Figure 46. Process Flow for SMF Data Unload Utility. The USER2 exit is invoked once for each record that meets the criteria in the IFASMFDP control statements. See z/OS MVS System Management Facilities (SMF) for more information. The USER3 exit is invoked once.

Process flow for IMS use of RACF



Figure 47. Process Flow for IMS Use of RACF

Process flows

Process flow for RACF Callable Services

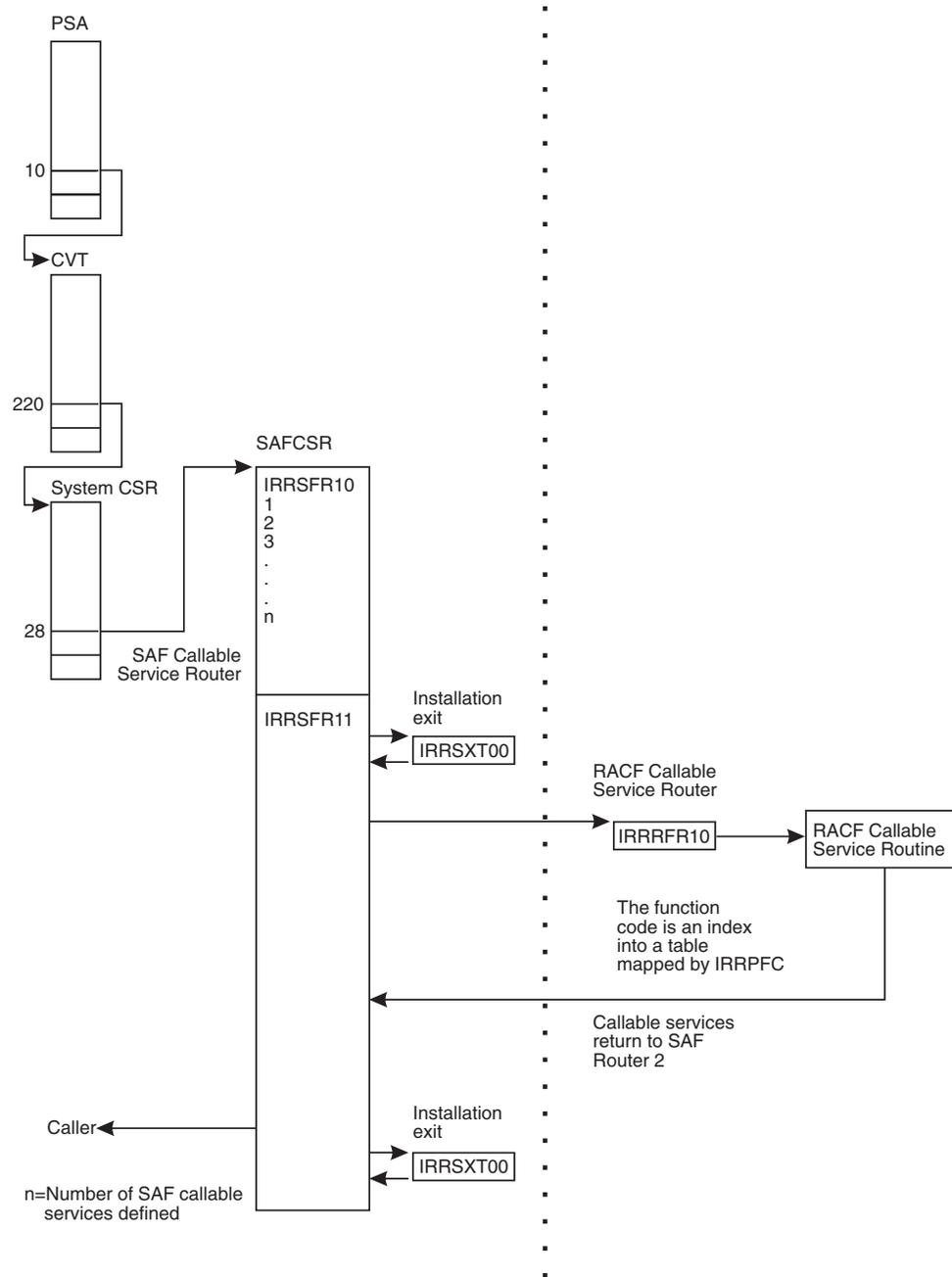


Figure 48. Process Flow for RACF Callable Services

Error recording for Callable Services

Environmental errors must be reported to allow their correction. Some of the RACF callable services create symptom records for errors and store them in the LOGREC data set.

z/OS MVS Programming: Assembler Services Guide categorizes information contained in the symptom records as:

- Component data

This section identifies the application in which the error occurred (that is, the RACF subsystem address space).

- Primary SDB symptoms

This section contains the primary string of problem symptoms. This data is used for duplicate problem recognition (see Table 26).

- Secondary SDB symptoms

This section contains any additional diagnostic values saved at the time of the error. See Table 27.

- Variable data

This section contains diagnostic data, such as portions of data areas or parameter lists pertinent to the error. See Table 28.

Table 26 shows the contents of the primary symptom string in the symptom record.

Table 26. Contents of Primary Symptom String for a Callable Service Error

SDB Key Literal	Usage
RIDS/	Module CSECT name
RIDS/	Load module name (IRRRFR10)
PCSS/	System service (MVS or RACF macro) that failed
PRCS/	Return code from service
PRCS/	Reason code from service (if no reason code is available, this field contains a value of zero)

Table 27 shows the contents of the secondary symptom string.

Table 27. Contents of Secondary Symptom String for a Callable Service Error

SDB Key Literal	Usage
ADRS/	Offset of service that failed

Table 28 shows the additional information that the symptom record contains.

Table 28. Additional LOGREC Data for a Callable Service Error

Field	Value
COMPDSC	RACF callable service
PROBLEM	Name of failing service
SERVLEV	Service level of module
COMPID	Component ID (5752XXH00)
COMPLEV	Component level (260)

Variable data recorded by RACF Callable Services

Each RACF callable service records additional variable data specific to the problem: **R_usermap (CSECT IRRRIM00)**

- Error determining the RACF user ID associated with an application user identity
 - Service name: RACXTRT or ICHEINTY

Error recording

- Variable data: The string 'IRRRIM00_XXXX:', where XXXX is the procedure name from which error occurs
- Additional variable data: application user identity and field names, such as SNAME or UNAME
- Error determining the application user identity associated with a RACF user ID
 - Service name: RACXTRT
 - Variable data: The string 'IRRRIM00_XXXX:', where XXXX is the procedure name from which error occurs
 - Additional variable data: RACF user ID and field names, such as SNAME or UNAME
- Figure 49 on page 193 shows an example of a symptom record when the user name is not found in an alias index entry but is found in the mapping profile.

Error recording

```

SYMPTOM RECORD
+000 E2D9F4F3 F8F1F1F2 F7F6F8F5 FFFFBCF1 |SR4381127685...1
+010 B388C6D9 4BC38185 40404040 40404040 |.HFR.CAE
+020 4040D9C1 C3C6D9F1 F040F5F7 F5F2C8C2 |RACFR10 5752HB
+030 C2F7F7F0 F3400080 00000000 00000000 |B7703 .....
+040 F1F00030 00640070 00490138 000E0181 |10.....A
+050 0068018F 00000000 00000000 00000000 |.....
+060 00000000 00000000 00000000 00000000 |.....
+070 E2D9F2F1 F1F0F5F7 F5F2E7E7 C8F0F000 |SR21105752XXH00.
+080 F7F7F0F3 C8D9C6F7 F7F0F340 00000000 |7703HRF7703 ....
+090 00000000 00000000 00000000 D9C1C3C6 |.....RACF
+0A0 40D69785 95C58489 A3899695 40C38193 |OPENEDITION CAL
+0B0 93818293 8540E285 99A54B40 00000000 |TABLE SERV. ....
+0C0 00000000 C9C3C8C5 C9D5E3E8 00000000 |....ICHEINTY....
+0D0 00000000 066839B1 066839B1 066839BF |.....
+0E0 066839BF 06683A27 06683A27 01000000 |.....
+0F0 06683830 00000000 00000000 F0F1F2F3 |.....0123
+100 F4F5F6F7 F8F9C1C2 C3C4C5C6 0049000E |456789ABCDEF....
+110 0068000F 00000000 F0F0F0F0 F1F4F0C3 |.....0000140C
+120 00000000 00000000 00000000 00000000 |.....
+130 00000000 00000000 D7C9C4E2 61F5F7F5 |.....PIDS/575
+140 F2E7E7C8 F0F040D7 D9C3E261 F0F0F0F0 |2XXH00 PRCS/0000
+150 F0F0F0C3 40D7D9C3 E261F0F0 F0F0F0F0 |000C PRCS/000000
+160 F0F040D9 C9C4E261 C9D9D9D9 C9D4F0F0 |00 RIDS/IRRRIM00
+170 40D9C9C4 E261C9D9 D9D9C6D9 F1F07BD3 |RIDS/IRRRFR10#L
+180 40C1C4D9 E261F0F0 F0F0F1F4 F0C340F0 |ADRS/0000140C 0
+190 000064C9 D9D9D9C9 D4F0F06D C1938981 |...IRRRIM00 ALIA
+1A0 A26DD396 837A40E2 D5C1D4C5 40D4E840 |S_LOC: SNAME MY
+1B0 D3D596A3 85A240C9 95869640 40404040 |LNOTES INFO
+1C0 LENGTH(0048) ==>ALL BYTES CONTAIN X'40'.

```

Figure 49. An Example of a Symptom Record when an SNAME is not found in the alias index entry but is found in the mapping profile (Part 2 of 2)

getGMAP (CSECT IRRRGM01)

- Error extracting the group name corresponding to the input group ID
 - Service name: RACXTRT or ICHEINTY
 - Variable data: The string 'IRRRGM01_XXXX: YYYY', where XXXX is the procedure name from which error occurs and YYYY is the GROUP mapping profile name for RACXTRT service or is the GROUP Alias name for ICHEINTY service
- Error extracting the group ID corresponding to the input group name
 - Service name: RACXTRT
 - Variable data: The string 'IRRRGM01_XXXX: YYYY', where XXXX is the procedure name from which error occurs and YYYY is the GROUP profile name

getUMAP (CSECT IRRRUM01)

- Error extracting the user name corresponding to the input user ID
 - Service name: RACXTRT or ICHEINTY
 - Variable data: The string 'IRRRUM01_XXXX: YYYY', where XXXX is the procedure name from which error occurs and YYYY is the USER mapping profile name for RACXTRT service or is the USER application identity name for ICHEINTY service
- Error extracting the user ID corresponding to the input user name
 - Service name: RACXTRT
 - Variable data: The string 'IRRRUM01_XXXX: YYYY', where XXXX is the procedure name from which the error occurs and YYYY is the USER profile name
- Figure 50 on page 195 shows an example of a symptom record when the user name is not found in an alias index entry but is found in the mapping profile.

```

TYPE: SYMPTOM RECORD      REPORT: SOFTWARE EDIT REPORT      DAY YEAR
                                REPORT DATE: 032 00
SCP:  VS 2 REL 3          ERROR DATE: 032 00
                                MODEL: 4381          HH MM SS.TH
                                SERIAL: 127685       TIME: 09:16:23.25
SEARCH ARGUMENT ABSTRACT:
PIDS/5752XXH00 PRCS/0000000C PRCS/00000000 RIDS/IRRRUM01
RIDS/IRRRFR10#L
    
```

```

SYSTEM ENVIRONMENT:
CPU MODEL: 4381          DATE: 032 00
CPU SERIAL: 127685      TIME: 09:16:23.25
SYSTEM: RACFR10        BCP: MVS
RELEASE LEVEL OF SERVICE ROUTINE: HBB7703
SYSTEM DATA AT ARCHITECTURE LEVEL: 10
COMPONENT DATA AT ARCHITECTURE LEVEL: 10
SYSTEM DATA: 00000000 00000000 |.....|
    
```

```

COMPONENT INFORMATION:
COMPONENT ID:          5752XXH00
COMPONENT RELEASE LEVEL: 7703
SERVICE RELEASE LEVEL: HRF7703
DESCRIPTION OF FUNCTION: RACF OPENEDITION CALLABLE SERV.
PROBLEM ID:           ICHEINTY
    
```

```

PRIMARY SYMPTOM STRING:
PIDS/5752XXH00 PRCS/0000000C PRCS/00000000 RIDS/IRRRUM01
RIDS/IRRRFR10#L
    
```

SYMPTOM	SYMPTOM DATA	EXPLANATION
PIDS/5752XXH00	5752XXH00	COMPONENT IDENTIFIER
PRCS/0000000C	0000000C	RETURN CODE
PRCS/00000000	00000000	RETURN CODE
RIDS/IRRRUM01	IRRRUM01	ROUTINE IDENTIFIER
RIDS/IRRRFR10#L	IRRRFR10#L	ROUTINE IDENTIFIER

```

SECONDARY SYMPTOM STRING:
ADRS/00000BAA
    
```

SYMPTOM	SYMPTOM DATA	EXPLANATION
ADRS/00000BAA	00000BAA	STORAGE ADDRESS

```

FREE FORMAT COMPONENT INFORMATION:
KEY = F000      LENGTH = 000100 (0064)
+000  C9D9D9D9  E4D4F0F1  6DC1D3C9  C1E26DE4  |IRRRUM01_ALIAS_U|
+010  D3D6C37A  40F1F2F3  F4F5F6F7  F8404040  |LOC: 12345678  |
+020  LENGTH(0064) ==> ALL BYTES CONTAIN X'40'.
+060  40404040  |
    
```

```

HEX DUMP OF RECORD:
HEADER
+000  4C831800  00000000  0000032F  09162325  |<C.....|
+010  FF127685  43810000  |...E.A..|
    
```

Figure 50. An Example of a Symptom Record when a UID is not found in the alias index entry but is found in the mapping profile (Part 1 of 2)

Error recording

```

SYMPTOM RECORD
+000 E2D9F4F3 F8F1F1F2 F7F6F8F5 FFFFBCF1 SR4381127685...1
+010 B388D17B 767DA544 40404040 40404040 .HJ#. 'V.
+020 4040D9C1 C3C6D9F1 F040F5F7 F5F2C8C2 RACFR10 5752HB
+030 C2F7F7F0 F3400080 00000000 00000000 B7703 .....
+040 F1F00030 00640070 00490138 000E0181 10.....A
+050 0068018F 00000000 00000000 00000000 .....
+060 00000000 00000000 00000000 00000000 .....
+070 E2D9F2F1 F1F0F5F7 F5F2E7E7 C8F0F000 SR21105752XXH00.
+080 F7F7F0F3 C8D9C6F7 F7F0F340 00000000 7703HRF7703 ....
+090 00000000 00000000 00000000 D9C1C3C6 .....RACF
+0A0 40D69785 95C58489 A3899695 40C38193 OPENEDITION CAL
+0B0 93818293 8540E285 99A54B40 00000000 LABEL SERV. ....
+0C0 00000000 C9C3C8C5 C9D5E3E8 00000000 ....ICHEINTY...
+0D0 00000000 06694591 06694591 0669459F .....J...J....
+0E0 0669459F 06694607 06694607 01000000 .....
+0F0 06694410 00000000 00000000 F0F1F2F3 .....0123
+100 F4F5F6F7 F8F9C1C2 C3C4C5C6 0049000E 456789ABCDEF...
+110 0068000F 00000000 F0F0F0F0 F0C2C1C1 .....00000BAA
+120 00000000 00000000 00000000 00000000 .....
+130 00000000 00000000 D7C9C4E2 61F5F7F5 .....PIDS/575
+140 F2E7E7C8 F0F040D7 D9C3E261 F0F0F0F0 2XXH00 PRCS/0000
+150 F0F0F0C3 40D7D9C3 E261F0F0 F0F0F0F0 000C PRCS/000000
+160 F0F040D9 C9C4E261 C9D9D9D9 E4D4F0F1 00 RIDS/IRRRUM01
+170 40D9C9C4 E261C9D9 D9D9C6D9 F1F07BD3 RIDS/IRRRFR10#L
+180 40C1C4D9 E261F0F0 F0F0F0C2 C1C140F0 ADRS/00000BAA 0
+190 000064C9 D9D9D9E4 D4F0F16D C1D3C9C1 ...IRRRUM01_ALIA
+1A0 E26DE4D3 D6C37A40 F1F2F3F4 F5F6F7F8 S_ULOC: 12345678
+1B0 LENGTH(0064) ==> ALL BYTES CONTAIN X'40'.

```

Figure 50. An Example of a Symptom Record when a UID is not found in the alias index entry but is found in the mapping profile (Part 2 of 2)

InitACEE (CSECT IRRRIA00)

- Certificate decoding problem
 - Service name: DECX509B
 - Variable data: The following 6 fullwords:
 1. Address of the certificate passed to InitACEE
 2. Length of the certificate passed to InitACEE
 3. Address of the byte found to be in error
 4. Internal diagnostic word
 5. Number of certificate bytes recorded in the next 4 variable data sections
 6. Number of certificate bytes skipped at the beginning of the certificate when recording
 - Additional variable data: up to 1024 bytes of the certificate
- Error in certificate profile (user ID not valid)
 - Service name: GETUSERI
 - Variable data: The string 'Bad DIGTCERT Class Profile'
 - Additional variable data: The name of the DIGTCERT class profile found to be in error
- Error in certificate profile (user ID not defined to RACF)
 - Service name: RACINIT
 - Variable data: The string 'Bad DIGTCERT Class Profile'
 - Additional variable data: The name of the DIGTCERT class profile found to be in error
- Unexpected return code from RACROUTE REQUEST=VERIFY

- Service name: RACINIT
- Variable data: The nine character user id being verified (1 byte length followed by up to 8 characters for the user ID itself)

InitACEE (CSECT IRRRIA02)

- Certificate decoding problem
 - Service name: DECX509B
 - Variable data: The following 6 fullwords:
 1. Address of the certificate passed to InitACEE
 2. Length of the certificate passed to InitACEE
 3. Address of the byte found to be in error
 4. Internal diagnostic word
 5. Amount of certificate data recorded
 6. Amount of certificate data truncated
 - Additional variable data: up to 1024 bytes of the certificate
- Error retrieving the CERTAUTH certificate repeat group from the irrcerta profile.
 - Service name: RACXTRT
 - Variable data: The string 'Couldn't extract the CERTAUTH anchor USER profile, irrcerta'.
 - Additional variable data: none
- Error extracting the private key size (CERTPRVS) from a DIGTCERT profile.
 - Service name: RACXTRT
 - Variable data: The string 'Bad CERTAUTH class profile:'*label-value*
 - Additional variable data: The profile name

InitACEE (CSECT IRRRIA05)

- Error extracting the trust status (UACC) from a DIGTCERT profile
 - Service name: RACEXTR
 - Variable data: The string 'Bad DIGTCERT Class Profile'
 - Additional variable data: The profile name
- Error extracting date fields CERTSTRT, CERTEND from a DIGTCERT profile
 - Service name: RACEXTR
 - Variable data: The string 'Bad DIGTCERT Class Profile'
 - Additional variable data: The profile name
- Error extracting the CERTAUTH anchor in the USER profile.
 - Service name: RACEXTR
 - Variable data: The string 'Bad USER class profile — irrcerta'

R_cacheserv (CSECT IRRRCH12)

- Physical error accessing the CACHECLS profile on the RACF database
 - Service name: ICHEINTY
 - Variable data: The string "LOCATE CACHECLS profile xxxx" where xxxx is the 16 byte profile name.
- Logical error with the contents of the CACHECLS profile read from the RACF database
 - Service name: Database (not a real Service, rather an indicator something was wrong with the profile read from the RACF database)

Error recording

- Variable data: The string "CACHECLS profile xxxx not valid:" where xxxx is the 16 byte profile name. Following that string is one of the following reasons the profile was determined not to be valid.
 - missing profile
 - profile not valid
 - timestamp is not correct
 - dataspace offset is not correct
 - dataspace size is not correct
 - dataspace count is not correct
 - cache version is not correct

R_cacheserv (CSECT IRRRCH13)

- Physical error accessing the CACHECLS profile on the RACF database
 - Service name: ICHEINTY
 - Variable data: The string "{LOCATE | ALTER | ADD} CACHECLS profile xxxx" where xxxx is the 16 byte profile name.

R_cacheserv (CSECT IRRRCH14)

- Physical error accessing the CACHECLS profile on the RACF database
 - Service name: ICHEINTY
 - Variable data: The string "{NEXT | DELETE} CACHECLS profile xxxx" where xxxx is the 16 byte profile name.

R_cacheserv (all CSECTs IRRRCHQx in IRRRCH16)

- Error occurred in dataspace layer
 - Service name: DISPLAYER
 - Variable data: xxxxxxxx yyyyyyyy zzzzzzzz aaaaaaaaaa bbbbbbbb: cccccccc
 - xxxxxxxx = Internal subroutine identifier

The following are possible values for xxxxxxxx. These identify the failing dataspace layer subroutine:

Table 29. Failing dataspace layer for an internal subroutine identifier

xxxxxxx	Dataspace layer call
8	dspCreate
24	dspDelete
28	dspConnect
32	dspExtend
36	dspExpose
40	dspHide
44	addAlet
48	delAlet
52	dspAdd
60	dspDisconnect
64	dasENQDS
68	dasDEQDs
76	dasSetVer
80	dasGetVer
84	dasCopyDS

- yyyyyyyy = Failing system service
- The following are possible values for yyyyyyyy. These identify the failing system service or internal request:

Table 30. Failing system service for a failing system service identifier

yyyyyyy	Failing system service
0	None
4	TCBTOKEN
8	DSPSERV CREATE
12	ALESERV ADD
16	DSPSERV DELETE
20	Dataspace does not exist
24	Dataspace header eyecatcher bad
28	Irrrch10 not found
32	IEANTCR
36	IEANTRT
40	IEANTDL
44	DSPSERV EXTEND
48	ALESERV DELETE
Uppercase values are z/OS system macros. Lower case values are internal requests.	

- zzzzzzzz = failing system service return code
- aaaaaaaaa = failing system service reason code
- bbbbbbbb = identifies R_cacheserv subroutine
- cccccccc = additional diagnostic text, such as "dspCreate failed"

R_cacheserv (CSECTs IRRRCHQx in IRRRCH16)

- Error occurred in dataspace layer
 - Service name: DSPLAYER
 - Variable data: bbbbbbbb: cccccccc
 - bbbbbbbb = identifies R_cacheserv subroutine
 - cccccccc = additional diagnostic text

R_cacheserv (CSECTs IRRRCHQC in IRRRCH16)

- Recovery attempted after a failure during cache creation
 - Service name: REEXPOSE
 - Variable data: bbbbbbbb: RE-EXPOSE cccccccc dddddddd
 - bbbbbbbb = identifies R_cacheserv subroutine
 - cccccccc = identifies failing object
 - dddddddd = successful or failed

R_cacheserv (CSECT IRRRCHQD, IRRRCHQG, IRRRCHQE in IRRRCH16)

- Name/token service failure
 - Service name: IEANTRT
 - Variable data: bbbbbbbb: IEANTRT error
 - bbbbbbbb = identifies R_cacheserv subroutine

Error recording

R_cacheserv (CSECT IRRRCHQG in IRRRCH16)

- Name/token service failure
 - Service name: IEANTCR
 - Variable data: bbbbbb: IEANTCR Error
 - bbbbbb = identifies R_cacheserv subroutine

R_cacheserv (CSECT IRRRCHQJ in IRRRCH16)

- Error restoring cache
 - Service name: RESTORE
 - Variable data: Restore: IRRRCH12 Restore DS error

R_Datalib (CSECT IRRRDL04)

- Error determining the owning user ID for a DIGTCERT profile
 - Service name: RACXTRT
 - Variable data: The string 'Method GETUSERID failed to extract the UserID'
 - Additional variable data: The profile name
- Error incrementing the last serial number (CERTLSER) of a DIGTCERT profile
 - Service name: RACXTRT or ICHEINTY
 - Variable data: The string 'Module IRRCDC29 failed to generate new Serial Number'
 - Additional variable data: The profile name

R_DCEAUTH (CSECT IRRRDA00)

- Create ACEE failure
 - Service name: RACINIT
 - Variable data: the RACF user ID
- Convert UUID to RACF user ID failure
 - Service name: RACXTRT
 - Variable data: the DCEUUIDS profile name
- Check authorization failure
 - Service name: RACHECK
 - Variable data: the RACF user ID, class, profile, and access requested
- Delete ACEE failure
 - Service name: RACINIT
 - Variable data: the ACEE address

R_DCEINFO (CSECT IRRRDI00)

- Extract DCE fields failure
 - Service name: RACXTRT
 - Variable data: the RACF user ID and the names of the fields
- Replace DCE fields failure
 - Service name: RACXTRT
 - Variable data: the RACF user ID and the names of the fields

R_DCERUID (CSECT IRRRUD00)

- Extract DCEUUIDS APPLDATA failure
 - Service name: RACXTRT
 - Variable data: the DCEUUIDS profile name

R_DCEKEY (CSECT IRRRDK00)

- Extract DCE key failure
 - Service name: RACXTRT
 - Variable data: the RACF user ID
- Replace DCE key failure
 - Service name: RACXTRT
 - Variable data: the RACF user ID

R_DCEKEY (CSECT IRRCP01)

- Extract KEYSMSTR key failure
 - Service name: ICHEINTY
 - Variable data: the class and profile name
- ICSF CSNBENC callable service failure
 - Service name: CSNBENC
 - Variable data: the RACF user ID
- ICSF CSNBDEC callable service failure
 - Service name: CSNBDEC
 - Variable data: the RACF user ID

R_PKIserv (CSECT IRRRPX00)

- Error calling RACROUTE REQUEST=AUTH to determine the caller's access to a FACILITY class profile
 - Service name: RACHECK
 - Variable data: The string 'Error in R_PKIserv attempting to check a caller's authority to the service'
 - Additional variable data: The FACILITY class profile name, the ACEE address, and the user ID from the ACEE

R_PKIserv (CSECT IRRRPX02)

- Error calling RACROUTE REQUEST=AUTH to determine the caller's access to a FACILITY class profile
 - Service name: RACHECK
 - Variable data: The string 'Error in R_PKIserv GENCERT attempting to check a caller's authority to the service'
 - Additional variable data: The FACILITY class profile name, the ACEE address, and the user ID from the ACEE
- Unexpected return code from RACDCERT internal subroutine IRRCDC23
 - Service name: IRRCDC23
 - Variable data: The string 'Error in R_PKIserv GENCERT attempting to call RACDCERT subroutine. Unexpected return code'
 - Additional variable data: The first 942 bytes of the RACDCERT internal work area
- Error calling RACROUTE REQUEST=EXTRACT to retrieve the PGMRNAME field from the USER profile
 - Service name: RACXTRT
 - Variable data: The string 'Error in R_PKIserv GENCERT attempting to extract PGMRNAME field to build Common Name'
 - Additional variable data: The user ID

R_PKIserv (CSECT IRRRPX04)

Error recording

- Error calling RACROUTE REQUEST=AUTH to determine the caller's access to a FACILITY class profile
 - Service name: RACHECK
 - Variable data: The string 'Error in R_PKIserv EXPORT attempting to check the caller's authority to the service'
 - Additional variable data: The FACILITY class profile name, the ACEE address, and the user ID from the ACEE
- Unexpected return code from RACDCERT internal subroutine IRRCDC25
 - Service name: IRRCDC25
 - Variable data: The string 'Error in R_PKIserv EXPORT attempting to call RACDCERT subroutine. Unexpected return code'
 - Additional variable data: The first 942 bytes of the RACDCERT internal work area

R_PKIserv (CSECT IRRRPX07)

- Error calling IRRCDC67 to find parent CERTAUTH chain to input certificate and build PKCS7 package.
 - Service name: IRRCDC67
 - Variable data: The string 'Error in R_PKIServ EXPORT attempting to call RACDCERT subroutine. Unexpected return code. '
 - Additional variable data: RACDCERT failing module and service in form of diagnostic data from the RACDCERT internal work area:
 - 4 bytes - internal service code
 - 4 bytes - service return code
 - 4 bytes - service reason code
 - 8 bytes - RACF class name
 - 8 bytes - RACF segment name
 - 80 bytes - message string
 - 4 bytes - RACF entity length
 - 4 bytes - number of extracted fields
 - 56 bytes - array of 8 byte field names (max 7 entries)
 - 256 bytes - RACF entity name

R_proxyserv (CSECT IRRRPY00)

- Name/token service failure
 - Service name: IEANTRT
 - Variable data: The string "Name/token service failure"
 - Additional variable data: The name for the requested token

R_proxyserv (CSECT IRRRPY01 and IRRRPY02)

- Error response from LDAP
 - Service name: LDAP
 - Variable data: Up to 100 bytes of the LDAP error message
- LDAP message response decoding failure
 - Service name: LDAPMSG
 - Variable data: One of the following strings –
 - "Error in LDAP message – Incorrect ASN.1 syntax"
 - "Error in LDAP message – Expected field not found"
 - "Error in LDAP message – Unsupported character set detected"

- Additional variable data: Up to 1024 bytes of the returned LDAP message

R_proxyserv (CSECT IRRCP01)

- Extract KEYSMSTR key failure
 - Service name: ICHEINTY
 - Variable data: the class and profile name
- ICSF CSNBENC callable service failure
 - Service name: CSNBENC
 - Variable data: the RACF user ID
- ICSF CSNBDEC callable service failure
 - Service name: CSNBDEC
 - Variable data: the RACF user ID

R_admin (CSECT IRRREQ00)

The R_admin callable service makes use of the RACF subsystem address space. RACF command images generated by the callable service or by the caller are passed to the RACF subsystem for execution by invoking the internal macro IRRREQ. The IRRREQ macro utilizes the IEFSSREQ macro to communicate with the RACF subsystem.

In this environment the following errors could occur:

- IRRREQ is unable to communicate with the RACF subsystem (for example, the RACF subsystem hasn't been started).
- IRRREQ is able to communicate with the RACF subsystem, but the RACF command fails in the RACF subsystem (for example, an ADDUSER command specifying a class that is not valid).

The R_admin callable service differentiates between these two errors. For the first error, the callable service returns a SAF return code of 8, a RACF return code of 12, and a RACF reason code set equal to the return code from IEFSSREQ. For the second error, the callable service returns a SAF return code of 8, a RACF return code of 16, and a RACF reason code set equal to the return code returned from the command's execution in the RACF subsystem. Additionally, the R_admin callable service writes symptom records to SYS1.LOGREC for the above errors. The symptom records contain the following information:

- Primary symptom string:
 - Component identifier (PIDS) - 5752XXH00
 - 1st return code (PRCS) - RACF return code from the callable service
 - 2nd return code (PRCS) - RACF reason code from the callable service
 - Csect routine identifier (RIDS) - IRRREQ00
 - Loadmod routine identifier (RIDS) - IRRRFR10#L
- Secondary symptom string:
 - Storage address (ADRS) - Error offset into IRRREQ00
- Free format component information: Specific to the error

For the first error (unable to communicate with the RACF subsystem), RACF records the following additional information in the free format area:

Error recording

Offset	Length	Description
0	1	R_admin callable service function requested
1	4	Address of the command image to be executed
5	2	Length of the command image to be executed

Figure 51 shows an example of a symptom record created when the R_admin callable service is unable to communicate with the RACF subsystem.

```

TYPE: SYMPTOM RECORD  REPORT: SOFTWARE EDIT REPORT  DAY YEAR
                                REPORT DATE: 348 96
SCP:  VS 2 REL 3          ERROR DATE: 348 96
                                MODEL: 4381          HH MM SS.TH
                                SERIAL: 111606        TIME: 15:24:51.20
SEARCH ARGUMENT ABSTRACT:
  PIDS/5752XXH00 PRCS/0000000C PRCS/00000004 RIDS/IRRREQ00
  RIDS/IRRRFR10#L

SYSTEM ENVIRONMENT:
  CPU MODEL: 4381          DATE: 348 96
  CPU SERIAL: 111606      TIME: 15:24:51.20
  SYSTEM:  NODE1          BCP:  MVS
  RELEASE LEVEL OF SERVICE ROUTINE:  JBB6604
  SYSTEM DATA AT ARCHITECTURE LEVEL:  10
  COMPONENT DATA AT ARCHITECTURE LEVEL: 10
  SYSTEM DATA: 00000000 00000000 |.....|
COMPONENT INFORMATION:
  COMPONENT ID:           5752XXH00
  COMPONENT RELEASE LEVEL: 240
  SERVICE RELEASE LEVEL:  HRF2240
  DESCRIPTION OF FUNCTION: RACF OPENEDITION CALLABLE SERV.
  PROBLEM ID:            IRRREQ

PRIMARY SYMPTOM STRING:
  PIDS/5752XXH00 PRCS/0000000C PRCS/00000004 RIDS/IRRREQ00
  RIDS/IRRRFR10#L

  SYMPTOM          SYMPTOM DATA      EXPLANATION
  -----          -
  PIDS/5752XXH00  5752XXH00      COMPONENT IDENTIFIER
  PRCS/0000000C   0000000C      RETURN CODE
  PRCS/00000004   00000004      RETURN CODE
  RIDS/IRRREQ00   IRRREQ00      ROUTINE IDENTIFIER
  RIDS/IRRRFR10#L IRRRFR10#L    ROUTINE IDENTIFIER

SECONDARY SYMPTOM STRING:
  ADRS/00000734

  SYMPTOM          SYMPTOM DATA      EXPLANATION
  -----          -
  ADRS/00000734   00000734      STORAGE ADDRESS

FREE FORMAT COMPONENT INFORMATION:
  KEY = F000      LENGTH = 000100 (0064)
+000  0204803C  A2000D40  40404040  40404040  |....S..  |
+010  LENGTH(0080) ==> ALL BYTES CONTAIN X'40'.
+060  40404040

```

Figure 51. An Example of a Symptom Record when the Callable Service Cannot Communicate with RACF

The IRRREQ (IEFSSREQ) return code is 4. Looking at the free format component information, the first byte has a value of X'02', indicating this was an ADMN_DEL_USER request. The next 4 bytes contain the address of the generated command image (X'04803CA2'). The sixth and seventh bytes contain the two byte length of the generated command image (X'000D').

For the second error (execution of the RACF command failed), the main intent of the symptom record is to capture the command image that was executed, because it might not be available elsewhere. Therefore, to limit the amount of user error information written to SYS1.LOGREC, RACF does not write symptom records for ADMN_RUN_COMD requests that fail. RACF also does not write symptom records for ADMN_ADD_USER requests where the RACF user ID already exists and ADMN_DEL_USER requests where the RACF user ID doesn't exist. For the cases where RACF does write a symptom record, the following additional information is recorded in the free format area:

- First X'64' byte area—Command message output (if any). This is the first message text string only and is truncated if it exceeds X'64' bytes in length.
- Next four X'100' byte areas—A copy of the command image that was executed. The command image is truncated if it exceeds 1024 (decimal) bytes in length.

You can trace the R_admin callable service to obtain information not included in the symptom records. For information on tracing, see “Tracing the R_admin callable service” on page 50.

Figure 52 on page 206 shows an example of a symptom record created when the R_admin callable service is able to communicate with the RACF subsystem, but the command fails.

Error recording

```

TYPE: SYMPTOM RECORD      REPORT: SOFTWARE EDIT REPORT DAY YEAR
                           REPORT DATE:    014 97
SCP:   VS 2 REL 3        ERROR DATE:     014 97
                           MODEL: 4381    HH MM SS.TH
                           SERIAL: 111606  TIME: 10:24:10.11

```

SEARCH ARGUMENT ABSTRACT:

```

PIDS/5752XXH00 PRCS/00000010 PRCS/00000008 RIDS/IRRREQ00
RIDS/IRRRFR10#L
SYSTEM ENVIRONMENT:
CPU MODEL: 4381          DATE: 014 97
CPU SERIAL: 111606      TIME: 10:24:10.11
SYSTEM:  NODE1          BCP:  MVS
RELEASE LEVEL OF SERVICE ROUTINE:  JBB6604
SYSTEM DATA AT ARCHITECTURE LEVEL:  10
COMPONENT DATA AT ARCHITECTURE LEVEL: 10
SYSTEM DATA: 00000000 00000000  |.....|

```

COMPONENT INFORMATION:

```

COMPONENT ID:           5752XXH00
COMPONENT RELEASE LEVEL: 240
SERVICE RELEASE LEVEL: HRF2240
DESCRIPTION OF FUNCTION: RACF OPENEDITION CALLABLE SERV.
PROBLEM ID:             IRRREQ
PRIMARY SYMPTOM STRING:
PIDS/5752XXH00 PRCS/00000010 PRCS/00000008 RIDS/IRRREQ00
RIDS/IRRRFR10#L

```

SYMPTOM	SYMPTOM DATA	EXPLANATION
PIDS/5752XXH00	5752XXH00	COMPONENT IDENTIFIER
PRCS/00000010	00000010	RETURN CODE
PRCS/00000008	00000008	RETURN CODE
RIDS/IRRREQ00	IRRREQ00	ROUTINE IDENTIFIER
RIDS/IRRRFR10#L	IRRRFR10#L	ROUTINE IDENTIFIER

SECONDARY SYMPTOM STRING:
ADRS/00000748

SYMPTOM	SYMPTOM DATA	EXPLANATION
ADRS/00000748	00000748	STORAGE ADDRESS

FREE FORMAT COMPONENT INFORMATION:

```

KEY = F000      LENGTH = 000100 (0064)
+000  C9D2D1F5  F6F7F0F2  C940C9D5  E5C1D3C9  |IKJ56702I INVALI
+010  C440C3D3  C1E2E240  D5C1D4C5  6B40C2C1  |D CLASS NAME, BA
+020  C4C3D3C1  E2E24040  40404040  40404040  |DCLASS
+030  LENGTH(0048) ==> ALL BYTES CONTAIN X'40'.
+060  40404040

```

```

KEY = F000      LENGTH = 000256 (0100)
+000  C1C4C4E4  E2C5D940  C7E4D4C2  E8404040  |ADDUSER GUMBY
+010  4040D5C1  D4C54040  40404040  40404040  |NAME ('
+020  D1968895  40D84B40  C7A49482  A87D5D40  |JOHN Q. GUMBY')
+030  404040C3  D3C1E4E3  C8404040  40404040  |CLAUTH (
+040  82818483  9381A2A2  5D40D7C1  E2E2E6D6  |BADCLASS) PASSWO
+050  D9C44040  40404DA7  A7A75D40  C1C4C4C3  |RD (XXX) ADDC
+060  C1E3C5C7  D6D9E840  40404040  8381A3F1  |ATEGORY (CAT1
+070  5D404040  40404040  40404040  40404040  |)
+080  LENGTH(0128) ==> ALL BYTES CONTAIN X'40'.

```

Figure 52. An Example of a Symptom Record when a Command Fails

In this example, the RACF subsystem return code is 8. In the free format component information, the first X'64' byte area contains the diagnostic message ("IKJ56702I INVALID CLASS NAME, BADCLASS") produced by executing the command image. The next four X'100' areas (only 1 in this case) contain the

command image itself (ADDUSER GUMBY NAME('JOHN Q. GUMBY') CLAUTH(BADCLASS) PASSWORD(XXX) ADDCATEGORY(CAT1)). Note that the actual password value is not recorded.

Control Block overviews for RACF

This section presents the links between control blocks that can be useful when diagnosing problems related to RACF.

RCVT and SAF Router Vector Table

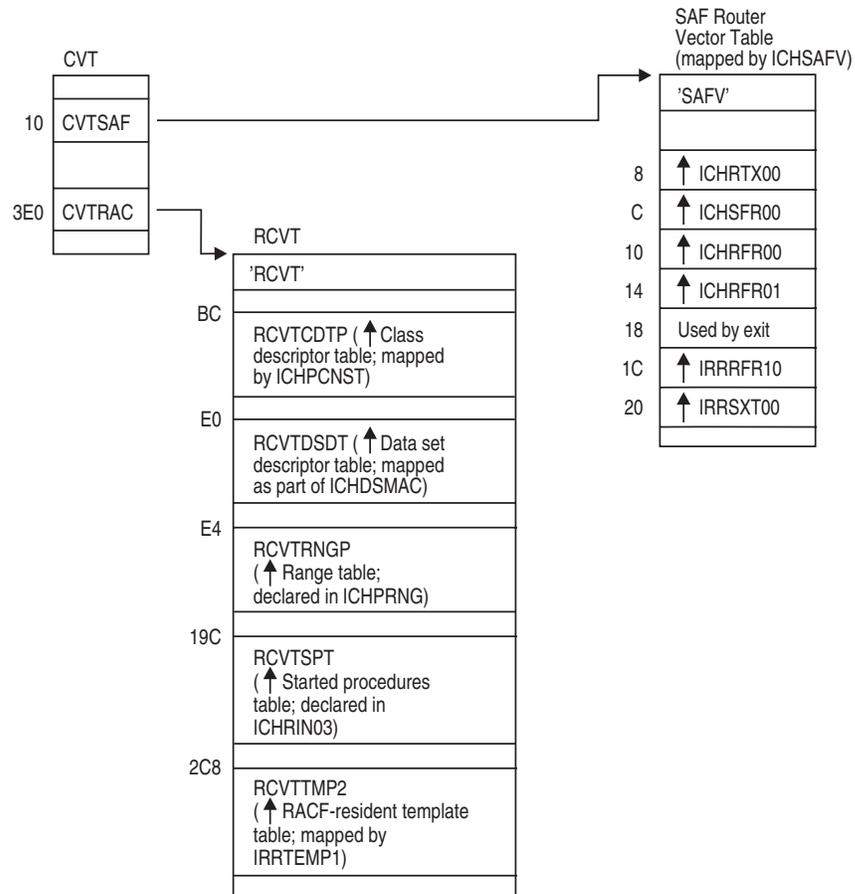


Figure 53. Control Block Overview: RCVT and SAF Router Vector Table

ACEE and related Control Blocks

The first time a RACROUTE REQUEST=VERIFY is issued for an address space, there is only one ACEE (accessor environment element), and it is pointed to by the ASXB (see Figure 54 on page 208).

For any subsequent task in the address space (multiple users), the following cases could occur:

- A table of pointers to ACEEs is set up in the address space. This occurs for CICS (Customer Information Control System) or IMS (Information Management System) address spaces.
- Another ACEE is created when the VERIFY request is issued. This ACEE is pointed to only by the TCB for that task. See Figure 55 on page 208.

Control Block overviews

- When a third-party AUTH request is used (USERID was specified on the RACROUTE REQUEST=AUTH), the ACEE is pointed to by an existing ACEE. See Figure 56.

For more information on how ACEEs are created and which ACEE is used, see *z/OS Security Server RACF System Programmer's Guide*.

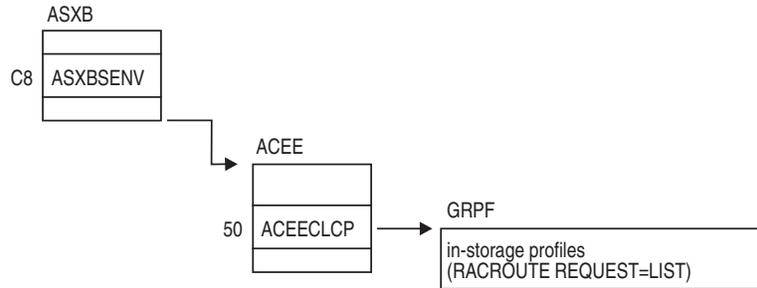


Figure 54. Control Block Overview: ACEE in a Single-User Address Space

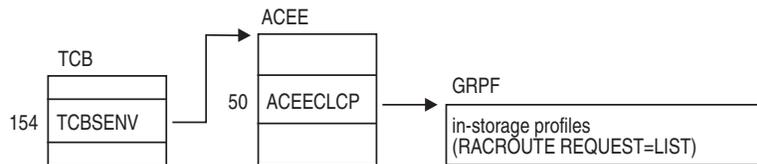


Figure 55. Control Block Overview: ACEE in a Multiple-User Address Space

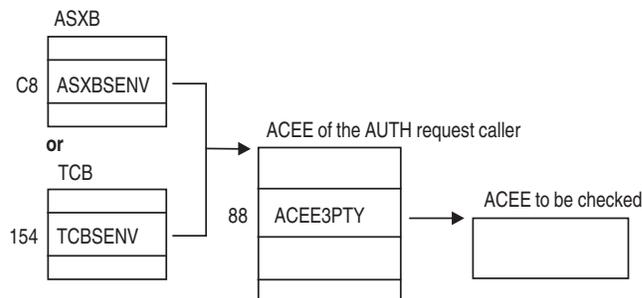


Figure 56. Control Block Overview: ACEEs When Third-Party AUTH Request Is Used

SVC dump title descriptions

This section describes the SVC (supervisor call instruction) dumps generated by RACF recovery routines.

SVC failure (ICHRST00)

This SVC dump issued by RACF has the form:

ICHRST00—RACF SVCS, ABEND CODE=sss-rrr, SVC=svcname, USER=RACF user ID or job name, GROUP=RACF group ID or step name[, EXIT= csectname]

Component:

Resource Access Control Facility (RACF), 5752-XXH00

Issuing Module:

ICHRST00—ESTAE

Explanation:

An abend has occurred during processing of one of the RACF SVCs or during processing of the GENLIST or RACLIST operand of the SETROPTS command. The values in the system dump title are:

sss

System completion code (abend code), in hexadecimal.

rrr Reason code associated with the system completion code (described in *z/OS Security Server RACF Data Areas*).

svcname

Name of the RACF routine handling the SVC and issuing the abend.

RACF user ID or job name

If interactive, RACF user ID of user who encountered the problem.

If batch, then name of job that encountered the problem.

RACF group ID or step name

If interactive, RACF group of user who encountered the problem.

If batch, then name of step that encountered the problem.

csectname

Name of the CSECT that probably caused the error.

System Action:

The executing task is terminated. The areas dumped are PSA, RGN, LPA, TRT, CSA, and SQA.

Problem Determination:

1. Look for the EXIT shown in the dump title:
 - If the EXIT shown in the system dump title is an installation exit, the installation exit probably caused the error (for a description of installation exits, see *z/OS Security Server RACF System Programmer's Guide*). Debug the installation exit. You can use standard debugging methods to analyze the problem described in this system dump.
 - If the EXIT shown in the system dump title is an IBM routine, or if EXIT is missing from the system dump title, follow the remaining steps in this procedure.
2. Look for message ICH409I as issued for this system dump. See the message text for the following:
 - Abend code and reason code (must be the same as in the dump title)
 - RACF macro or SETROPTS command option (GENLIST or RACLIST) that was being processed
 - Whether parameter validation or other processing was being done

See *z/OS Security Server RACF Messages and Codes* for an explanation of ICH409I and of the abend code (and its reason code, if supplied).

3. If ICH409I is not available, see *z/OS Security Server RACF Messages and Codes* for an explanation of the abend code (*sss*) and reason code (*rrr*) from the dump title.
4. If the explanation of the code does not help you solve the problem and the EXIT named in the system dump title is an IBM routine, see "Abends" on page 9 for instructions on debugging the problem.

SVC dump descriptions

Other Problem Data Produced:

A software record is written to SYS1.LOGREC and includes:

SDWAMODN	Main CSECT (control section) name of SVC (supervisor call instruction)
SDWACSCT	Blanks or name of routine in control at time of error
SDWAREXN	ICHRST00 (recovery routine)
SDWAGR15	Reason code if the abend is a RACF abend
SDWACRC	Completion code
SDWACID	XXH00
SDWAEAS	1 if SDUMP is generated by ICHRST00
SDWAREQ	Zero if SDUMP is generated by ICHRST00

RACF initialization failure (ICHSEC02)

The form of this dump issued by RACF depends on the cause of the dump.

Component:

Resource Access Control Facility (RACF), 5752-XXH00

Issuing Module:

ICHSEC02—ESTAE

Explanation:

An abend has occurred during RACF initialization processing. The areas dumped are SQA, CSA, NUC, and RGN.

Problem Determination:

1. See message ICH505A for the abend code that caused the system dump.
2. If message ICH529I was issued, an RVARY command failed.
3. See *z/OS Security Server RACF Messages and Codes* for an explanation of the abend code and the messages.
4. If the explanations in *z/OS Security Server RACF Messages and Codes* do not help you solve the problem, see “Abends” on page 9 for instructions on debugging the problem.

Other Problem Data Produced:

A software record is written to SYS1.LOGREC and includes:

SDWAMODN	ICHSEC00 (module detecting the error)
SDWAREXN	ICHSEC02 (recovery routine)
SDWACID	XXH00
SDWACSCT	ICHSEC00
SDWAEAS	1 if SDUMP is generated by ICHSEC00
SDWAREQ	Zero if SDUMP is generated by ICHSEC00

RACLIST failure (IRRCOP10)

This dump issued by RACF has the form:

IRRCOP10—RACF RACLIST TO A DATA SPACE FAILED FOR CLASS=*classname***Component:**

Resource Access Control Facility (RACF), 5752-XXH00

Issuing Module:

IRRCOP10—Copy RACLISTed Class to a Data Space

Explanation:

One of the following failed when attempting to copy the in-storage profiles into a data space during RACF initialization:

- SETROPTS RACLIST
- SETROPTS RACLIST REFRESH
- RACROUTE REQUEST=LIST,GLOBAL=YES request
- RACLIST

System Action:

The RACLIST for *classname* failed. A dump was taken to help determine the cause of the problem. Areas dumped are CSA, LSQA, and the data space.

Problem Determination:

1. Determine the cause of the failure by checking the return and reason codes provided by:
 - Message ICH14058I for the SETROPTS RACLIST or SETROPTS RACLIST REFRESH cases
 - Message ICH546I for the RACLIST during initialization case
 - Message IRRL0002I for the RACROUTE REQUEST=LIST,GLOBAL=YES case
2. Use standard debugging methods to analyze the dump itself. To look at a data space with IPCS, you must know the name of the data space. The name of a data space obtained for RACLIST purposes is “IRRx`xxxx`”, where `xxxx` is a hex number. The name of the data space in this dump can be obtained by an IPCS command, “listdump select”. Simply scan the command’s output for “DSPNAME” and use the resulting name and ASID to access the data space.

RACF COPY RACGLIST failure (IRRRLS12)

The form of this dump is:

IRRRLS12—RACF COPY RACGLIST *classname_nnnnn* PROFILES FOR CLASS=*classname***Component:**

Resource Access Control Facility (RACF), 5752-XXH00

Issuing Module:

IRRRLS12—RACF RACGLIST to Data Space Routine

Explanation:

Problems were encountered while trying to read A RACGLIST *classname_nnnnn* profile in order to use the RACLIST results stored in those profiles to build the RACLIST data space for *classname*.

System Action:

In addition to taking this dump, RACF issues IRRL0000I, which identifies the specific profile and the manager return and reason codes for the failure.

SVC dump descriptions

RACF proceeds to RACLIST *classname* by reading *classname*'s discrete and generic profiles from the database to build the RACLIST results, which are then copied to the RACLIST data space. Areas dumped are SQA, LSQA, PSA, RGN, LPA, TRT, CSA, and SUMDUMP.

Problem Determination:

1. Determine the cause of the failure by checking the return and reason codes provided by message IRRLO000I.
2. Use standard debugging methods to analyze the dump itself.

RACF CREATE RACGLIST failure (IRRRLS13)

The form of this dump is:

IRRRLS13—RACF CREATE RACGLIST *classname_nnnnn* PROFILES FOR CLASS=*classname*

Component:

Resource Access Control Facility (RACF), 5752-XXH00

Issuing Module:

IRRRLS13—RACF Data Space to RACGLIST Routine

Explanation:

Problems were encountered while trying to write a RACGLIST *classname_nnnnn* profile to the database after building a raclist data space while RACLISTing *classname*.

System Action:

In addition to taking this dump, RACF issues IRRLO000I, which identifies the specific profile and the manager return and reason codes for the failure. RACF attempts to delete all the RACGLIST *classname_nnnnn* profiles. The RACLIST operation successfully built the RACLIST data space for *classname*. Areas dumped are SQA, LSQA, PSA, RGN, LPA, TRT, CSA, and SUMDUMP.

Problem Determination:

1. Determine the cause of the failure by checking the return and reason codes provided by message IRRLO000I.
2. Use standard debugging methods to analyze the dump itself.

RACF DELETE RACGLIST failure (IRRRLS14)

The form of this dump is:

IRRRLS14—RACF DELETE RACGLIST *classname_nnnnn* PROFILES FOR CLASS=*classname*

Component:

Resource Access Control Facility (RACF), 5752-XXH00

Issuing Module:

IRRRLS14—RACF Delete RACGLIST *classname_nnnnn*

Explanation:

Problems were encountered while trying to delete a RACGLIST *classname_nnnnn* profile from the database.

System Action:

In addition to taking this dump, RACF issues IRRLO000I, which identifies the specific profile and the manager return and reason codes for the failure.

If the command being processed was RDELETE RACGLIST *classname*, RACF terminates command processing. If the command was one of the commands or requests causing RACF to RACLIST *classname*, the RACLIST succeeded, but RACGLIST *classname_nnnnn* was not updated. Areas dumped are SQA, LSQA, PSA, RGN, LPA, TRT, CSA, and SUMDUMP.

Problem Determination:

1. Determine the cause of the failure by checking the return and codes provided by message IRRLO000I.
2. Use standard debugging methods to analyze the dump itself.

RACF data space recovery failure (IRRRLS15)

The form of this dump is:

IRRRLS15—RACF RACLIST TO A DATA SPACE RECOVERY FOR CLASS=*classname*

Component:

Resource Access Control Facility (RACF), 5752-XXH00

Issuing Module:

IRRRLS15—RACF RACLIST to Data Space Recovery

Explanation:

One of the following abended while processing a data space:

- SETROPTS RACLIST
- SETROPTS RACLIST REFRESH
- RACLIST during initialization
- RACROUTE REQUEST=LIST, GLOBAL=YES

The ICHRST00 dump described on page 208 is also taken. This dump provides the data space, which is not provided by the ICHRST00 dump.

System Action:

The command or request failed. A dump was taken to determine the cause of the problem. Areas dumped are CSA, LSQA, and the data space.

Problem Determination:

1. Analyze the ICHRST00 dump as described earlier.
2. Use standard debugging methods to analyze this dump. To look at a data space with IPCS, you must know the name of the data space. The name of a data space obtained for RACLIST purposes is "IRRxxxx" where xxxx is a hex number. The name of the data space in the dump can be obtained by an IPCS command, "listdump select". Simply scan the command's output for "DSPNAME" and use the resulting name and ASID to access the data space.

RACF subsystem failures (IRRSSC01 and IRRSSS01)

All dumps issued by the RACF subsystem have the form:

DUMP_TITLE=uuuu subsystem,vvvvvvvv task,www yyyy module,zzzzzzz segment.

The appropriate subsystem name, task name, abend code, module name, and segment name are all provided. The numbers following the module name give the compile date for that module.

SVC dump descriptions

An example of a RACF subsystem dump title is:

DUMP_TITLE=RACF Subsystem,IRRSSC00 task,0C1 abend,
IRRSSM04 92100 module,WAITECB segment.

Component:

RACF (5752-XXH00)

Issuing Modules:

IRRSSC01 IRRSSS01

Explanation:

The RACF subsystem has issued dumps.

Problem Determination:

1. See *z/OS MVS System Codes* for an explanation of the abend code and the messages.
2. If the explanations in *z/OS MVS System Codes* do not help you solve the problem, see “Abends” on page 9 for instructions on debugging the problem.

Persistent verification failures

Dumps issued by RACF for persistent verification support in RACF’s subsystem have the form:

**DUMP_TITLE=COMPON=RACF,COMPID=5752XXH00,ISSUER=IRRSGN06,
MODULE=mmmmmmmm,ABEND=S0xxx,REASON=yyyyyyyy**

Component:

RACF (5752-XXH00)

Issuing Module:

mmmmmmmm

Explanation:

The RACROUTE REQ=SIGNON service has issued a dump.

Problem Determination:

1. Look up the abend and reason code in *z/OS Security Server RACF Messages and Codes*.
2. Use standard debugging methods to analyze the dump.

RACF I/O failures

Dumps issued by the RACF manager when an I/O occurs while processing a RACHECK, RACINIT, RACDEF, or RACF command request have the form:

**DUMP TITLE= ISSUER=IRRMER01-RACF SVCS, I/O ERROR,SVC=xxxxxxxx,
USER=yyyyyyyy ,GROUP=zzzzzzzz**

where:

xxxxxxxx is the SVC name

yyyyyyyy is the RACF user’s name from the ACEE or job name.

zzzzzzzz is the RACF user’s group name from the ACEE or step name.

An example of a RACF I/O dump title is:

DUMP TITLE= ISSUER=IRRMER01-RACF SVCS, I/O ERROR,SVC=ICHRSV00,
USER=IBMUSER ,GROUP=SYS1

Component:
RACF (5752-XXH00)

Issuing Modules:
IRRMER01

Explanation:
An I/O error occurred and RACF issued an Sdump.

RACF index block error

In some cases where message IRR4071 is issued, a DAE suppressible dump might be provided as a problem determination aid. This can occur during SVC 132 processing.

**DUMP TITLE=COMPON=RACF,COMPID=5752XXH00,ISSUER=ICHRSV00,
MODULE=IRRML000,MANAGER RC=4C,RBA=xxxxxxxxxxxx**

where:

xxxxxxxxxxxx is the RBA of the index block (which is not valid)
that produced message IRR4071.

An example of a RACF Index Block error dump title is:

DUMP TITLE=COMPON=RACF,COMPID=5752XXH00,ISSUER=ICHRSV00,
MODULE=IRRML000,MANAGER RC=4C,RBA=000000001000

Component:
RACF (5752-XXH00)

Issuing Modules:
ICHRSV00

Explanation:
ICHRSV00 takes a DAE suppressible dump in cases where the RACF manager detects an index block that is not valid. In some cases this error occurs because of storage overlay. This dump captures information that might be helpful in debugging the overlay. IRRML000 is the RACF manager routine that determines whether conditions exist that call for this dump to be taken.

Dump title description for Callable Services

The following dump title is displayed on the MVS console when a RACF module used for processing a SAF callable service abends:

**DUMP_TITLE=ISSUER=csect,COMPID=5752-
XXH00,COMPON=RACF,CSECT=aaaaaaaa, LVL=bbbbbbbb,ABEND=ssss-
rrr,USR=ccccccc**

Where:

csect is the name of the csect that issued the dump, either IRRRCOMR or IRRRCHD7

aaaaaaaa is the name of the RACF module that abended

bbbbbbbb is the product fmid (i.e. HRF7706)

sss is the system completion code (abend code), in hexadecimal

rrr is the reason code associated with the system completion code

Dump title description

`ccccccc` is the user's name from the RACF ACEE

When the module abends, the executing task is terminated. The areas dumped are RGN, SQA, TRT, and SUM.

Dump titles for the RACF/DB2 External Security Module

The RACF/DB2 external security module generates the following dump titles:

```
COMPON=RACF,COMPID=5752XXH00,ISSUER=DSNX@FRR,MODULE=IRR@XACS,  
ABEND=S0sss,REASON=NONE,L=zzzzzzzz
```

```
COMPON=RACF,COMPID=5752XXH00,ISSUER=DSNX@FRR,MODULE=IRR@XACS,  
ABEND=S0sss,REASON=aaaaaaaa,L=zzzzzzzz
```

```
COMPON=RACF,COMPID=5752XXH00,ISSUER=DSNX@FRR,MODULE=IRR@XACS,  
ABEND=Uuuuu,REASON=NONE,L=zzzzzzzz
```

```
COMPON=RACF,COMPID=5752XXH00,ISSUER=DSNX@FRR,MODULE=IRR@XACS,  
ABEND=Uuuuu,REASON=aaaaaaaa,L=zzzzzzzz
```

where:

`sss` is the system abend code

`uuuu` is the user abend code

`aaaaaaaa` is the abend reason code

`zzzzzzzz` is the module length

RACF/DB2 External Security Module diagnostic information

The RACF/DB2 external security module returns a parameter, XAPLDIAG, that DB2® and other program products can use to trap and obtain diagnostic information. When the RACF/DB2 external security module issues a RACROUTE REQUEST=FASTAUTH check that fails to grant access, the module records the failing SAF return code, RACF return code, and RACF reason code in XAPLDIAG. Each invocation of the RACF/DB2 external security module can issue multiple RACROUTE REQUEST=FASTAUTH macros, but the module can return only a single return code. However, the module can store up to 10 sets of return codes from failing RACROUTE REQUEST=FASTAUTH macros in XAPLDIAG, allowing the results of a specific RACROUTE REQUEST=FASTAUTH macro to be determined.

The XAPL parameter list can be captured using DB2 trace record IFCID 314. In addition, the return code and corresponding reason code (EXPLRC1 and EXPLRC2) for authorization failures are captured in DB2 trace record IFCID 140. The DB2 trace facility is documented in *DB2 Administration Guide*, SC26-8957.

The content of XAPLDIAG depends on the return code and reason code from the RACF/DB2 external security module.

- If EXPLRC1=4 and ECPLRC2=14 (decimal), the ALESERV failed and the module made no RACROUTE REQUEST=FASTAUTH checks. In this case the first word of XAPLDIAG contains the non-zero ALESERV return code.
- Otherwise, each word of XAPLDIAG can contain a SAF return code, RACF return code, and RACF reason code corresponding to a non-zero return code from a RACROUTE REQUEST=FASTAUTH macro. Information related to non-zero return codes is stored in XAPLDIAG beginning with the first word until information related to all non-zero return codes has been stored, or until the XAPLDIAG area has filled. XAPLDIAG contains 10 words, allowing information

RACF/DB2 diagnostic information

related to 10 FASTAUTH requests to be stored for an invocation of the RACF/DB2 external security module. If more than 10 FASTAUTH requests are issued, only the first 10 sets of return codes are stored.

Starting with DB2 Version 7, DBADM authorization checking for the CREATE VIEW privilege may result in more than 10 FASTAUTH requests, because a CREATE VIEW request may reference tables, or a combination of tables and views, from multiple databases. DB2 Version 7 passes the names of all the databases referenced in the CREATE VIEW using a database list pointed to by XAPLREL2. If SYSCTRL or SYSADM authorization checking does not grant the CREATE VIEW privilege and the XAPLCRVW field indicates that DBACRVW is enabled, the RACF/DB2 external security module checks the user's DBADM authorization for each database in the list. The result of each DBADM check is placed in the XAPLDBDA field associated with each database. The RACF/DB2 external security module updates XAPLDBDA with the following codes:

- Y** Access to the database is allowed.
- N** Access to the database is not allowed.
- U** RACF was unable to return a decision. This occurs when the FASTAUTH request returns a SAF return code of X'04'.

Although DBADM checks may be done for multiple databases, only the results of the first 10 FASTAUTH requests are stored in XAPLDIAG. The results of all DBADM checking for each database is contained in the XAPL parameter list and is available using DB2 trace record IFCID 314.

The RACF/DB2 external security module truncates the SAF return codes and RACF return codes to one byte, and the RACF reason code to two bytes, before storing them in XAPLDIAG. The format of each word in XAPLDIAG is:

xyyzzzz

where:

- xx* is the SAF return code
- yy* is the RACF return code
- zzzz* is the RACF reason code

For a list of the RACF return codes and reason codes and their meanings, see *z/OS Security Server RACF System Programmer's Guide*.

For additional information on common problems that can occur as a result of adding installation-defined classes to the class descriptor table (CDT) for DB2 objects, see *z/OS Security Server RACF Security Administrator's Guide*.

VRA keys provided by RACF for some abends

For some abends, RACF provides VRA (variable recording area) keys that can help in describing a problem to the IBM support center or in narrowing a search when an initial search gets too many matches.

The VRA is part of the SDWA (system diagnostic work area) that recovery routines can use when a problem occurs. The VRA can be included in a SYS1.LOGREC record and in a system dump. To format the VRA, use the DAEDATA control statement in PRDMP or the DAEDATA verbexit in IPCS. Symptoms included in the

VRA keys

VRA can be formatted using the SYMPTOMS control statement in PRDMP or the SYMPTOMS verbexit in IPCS.

ICHRST00-RACF SVCS, ABEND CODE=0C1-A62,SVC=ICHRSV00,USER=IBMUSER MODULE SVCDUMP DATE 07/13/87 TIME14.12.06 PAGE 00000004

RETAIN SEARCH ARGUMENT:

RIDS/ICHRSV00#L RIDS/ICHMDR00 AB/S00C1 VALU/H91204074 REGS/0F8B4

REGS/0E78A PRCS/00 000001

SYMPTOMS PRESENT FOR USE AS A UNIQUE DUMP IDENTIFIER BY DAE:

MVS KEY	RETAIN KEY	SYMPTOM DATA	EXPLANATION
MOD/	RIDS/	ICHRSV00	LOAD MODULE NAME
CSECT/	RIDS/	ICHMDR00	ASSEMBLY MODULE CSECT NAME
AB/S	AB/S	S00C1	ABEND CODE-SYSTEM
F/	VALU/H	90EC5058000001091204074	FAILING INSTRUCTION AREA
REGS/	REGS/	0F8B4	REG/PSW DIFFERENCE
REGS/	REGS/	0E78A	REG/PSW DIFFERENCE
HRC1/	PRCS/	00000001	REASON CODE

} Use these symptoms for initial searches

ADDITIONAL SYMPTOM DATA NOT USED BY DAE TO IDENTIFY THIS DUMP:

MVS KEY	RETAIN KEY	SYMPTOM DATA	EXPLANATION
VHID/	PCSS/	RACFCNTS	HEADER FOR DATA
VHID/	PCSS/	IPLPTR	HEADER FOR DATA
VHID/	PCSS/	ACTNPTR	HEADER FOR DATA
VHID/	PCSS/	TESTPTR	HEADER FOR DATA
VHID/	PCSS/	MGRREQST	HEADER FOR DATA
VHEX/	VALU/H	01000000	HEX ERROR DATA
VHEX/	VALU/H	0000EB74	HEX ERROR DATA
ASID1/	VALU/H	000F	TASK RELATED ASID
ORRC1/	PRCS/	00000001	ORIGINAL REASON CODE

} Use these symptoms to analyze a problem
 Use the value of MGRREQST to narrow a search if your first search gets too many matches

Figure 57. Sample Symptoms for RACF (DAEDATA Output). This figure includes the RETAIN search argument and the VRA keys as formatted by DAEDATA.

- 1** A number of headers for VRA keys are produced by RACF. These headers (labeled HEADER FOR DATA) describe error data (labeled HEX ERROR DATA). For example, in this dump RACFCNTS is the header for 01000000, and IPLPTR is the header for 0000EB74.

Headers	Description
RACFCNTS	Number of the current RACF macro request on which the RACF manager failed. This number can be interpreted as X'wwxyzzz', where: <ul style="list-style-type: none"> ww is the number of the IPL being processed xx is the number of the action being processed yy is the number of the test being processed zz is reserved
IPLPTR	Pointer to the input parameter list for the current RACF manager request.
ACTNPTR	Pointer to the action being performed at the time of the abend.
TESTPTR	Pointer to the test being performed at the time of the abend.
MGRREQST	RACF manager request ID for the ICHEINTY macro being performed at the time of the abend. This request ID is also reported in message ICH413I. This ID is included only on internal RACF requests.

```

ICHRST00-RACF SVCS, ABEND CODE=0C1-A62,SVC=ICHRSV00,USER=IBMUSER MODULE SVCDDUMP DATE 07/13/87 TIME14.12.06 PAGE 00000002
** INFORMATION AT TIME OF ERROR **
PSW - 070C0000 81B6D316          CSECT AT TIME OF ERROR - ICHMDR00
                                ABEND/COMPLETION CODE - S0C1
DATA POINTED TO BY PSW          REASON CODE - 00000001
01B6D310 90EC50580000          ASID IN SDWA - 000F
01B6D316 001091204074          ADDRESS OF SDWA - 005CCB40
REGS 0-7          00003000      005DF178      005D58FC      81B6CA16      01BF7C40      005CFE10      01B41C71      01B43274
REGS 8-15        01BE7978      005D5000      01BE7D78      00000010      01BE7C40      005CFE10      81B6CB8C      81B6CA62

SDWA
0000 005DFD60 040C1000 FF040001 00000000 FF850084 5000EBA2 00003000 00000000 *..... 1*
0020 005D58FC 81B6CA16 01BF7C40 005CFE10 01B41C71 01B43274 01BE7978 005D5000 *.....
0040 01BE7D78 00000010 01BF7C40 005CFE10 81B6CB8C 81B6CA62 005FD338 00000000 *.....L*
0060 00000000 00000000 070C0000 81B6D316 00020001 01C00EF4 070C0000 81B6D316 *.....L.....4.....L*
0080 00020001 01C00EF4 00003000 005DF178 005D58FC 81B6CA16 01BF7C40 005CFE10 *.....4.....1.....*
00A0 01B41C71 01B43274 01BE7978 005D5000 01BE7D78 00000010 01BF7C40 005CFE10 *.....
00C0 81B6CB8C 81B6CA62 E60004C0 00000000 00000000 00000000 00000000 00000000 *.....W.....*
00E0 00000000 00000000 40040801 00001000 00000000 005CCCD0 00000000 00800000 *.....
0100 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....
0120 000F0000 C9C3C8D9 E2E5F0F0 C9C3C8D4 C4D9F0F0 00000000 00000000 005CCCB0 *.....ICHRSV00ICHMDR00.....*
0140 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....
0160 00000000 00000000 00000000 FFFF0003 005CCEA0 0080000F 0000000F 00000000 *.....

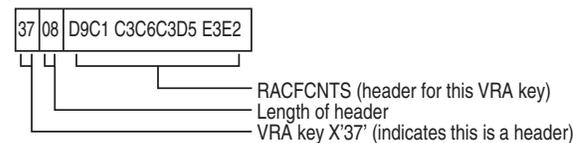
                                1                                2

0180 00000000 00000000 00000000 00000000 00FF2054 3708D9C1 C3C6C3D5 E3E23804 *.....RACFCNTS.*
01A0 01000000 3708C9D7 D3D7E3D9 40403804 0000EB74 3708C1C3 E3D5D7E3 D9403804 *.....IPLPTR.....ACTNPTR.*

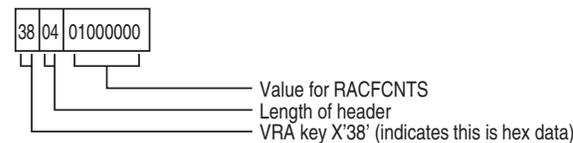
01C0 00000000 3708E3C5 E2E3D7E3 D9403804 00000000 3708D4C7 D9D9C5D8 E2E33908 *.....TESTPTR.....MGRREQST.*
01E0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 *.....
0200 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 *.....
0220 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 *.....
0240 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 *.....
0260 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 *.....
0280 40404040 40404040 40404040 40404040 404040E2 C4E6C140 005CCEB8 005CCDD8 *.....SDWA.....Q*
    
```

Figure 58. Sample SDWA for RACF

1 HEADER FOR DATA



2 HEX ERROR DATA



Front-ending RACF commands

The RACF common command exit, IRREVSX01, allows customers to customize or cancel RACF commands before the RACF command processor is invoked. This exit is the recommended vehicle for preprocessing RACF commands. Before RACF provided this exit, some customers created their own front-end processors to preprocess RACF commands. Because RACF 2.2 changed the way RACF processes commands, customers who wrote front-end processors before RACF 2.2 and who want to continue to use these front-end processors might have to change them. This section is intended for those customers.

Note: If you currently use a front-end processor for commands, it is recommended that you replace it with an IRREVSX01 exit.

Command processing changes

Before RACF 2.2, when a RACF TSO command was issued, control was passed directly to the appropriate command processor.

Front-ending

To make this happen, RACF included an entry similar to the following for ADDGROUP in the linkage editor statements for each RACF command.

```
INCLUDE AOSBN(ICHCAG00)
INCLUDE AOSBN(other modules)
:
ALIAS AG,ADDGROUP
ENTRY IHCAG00
SETCODE AC(1)
NAME IHCAG00(R)
```

Note: AG or ADDGROUP is the alias name by which the command is issued by a user and IHCAG00 is the full name of the command by which it is invoked internally.

In RACF 2.2 and OS/390 Security Server (RACF), the entry in the linkage editor statements for most RACF commands look like this:

```
INCLUDE AOSBN(ICHCAG00)
INCLUDE AOSBN(other modules)
:
ENTRY IHCAG00
NAME IHCAG00(R)
```

Note: The aliases are not present.

The aliases have been removed from each individual command and placed in a new entry for IRRENV00.

```
INCLUDE AOSBN(IRRENV00)
INCLUDE AOSBN(other modules)
ENTRY IRRENV00
ALIAS AD,ADDSD
ALIAS AG,ADDGROUP
ALIAS other commands
:
SETCODE AC(1)
NAME IRRENV00(R)
etc.
```

IRRENV00 receives control before each command processor. If the AT or ONLYAT keywords were not specified, IRRENV00 invokes the appropriate command processor using its full name. When the command processor returns control, IRRENV00 determines if automatic direction is required for the command. If so, a work item is sent to the RACF subsystem address space. If the AT or ONLYAT keywords were specified, IRRENV00 sends the command to the RACF subsystem address space for processing.

Considerations if writing a command front-end processor

If IRRENV00 processing is bypassed by a front-end processor, RACF remote sharing functions (RRSF) will not work. When writing a command front-end processor, ensure IRRENV00 gets control somewhere in the processing before the command processor.

To ensure that all RRSF functions will be processed as specified, commands must be invoked by one of the alias names with which they are shipped (for example, AG, ADDGROUP, ADDSD, and so on). When IRRENV00 receives control, the command buffer must have one of the two alias names in the first position. For example, AG or ADDGROUP should be coded, not IHCAG00. If a front-end processor gets control prior to IRRENV00, set the command buffer correctly prior to attaching or linking to IRRENV00. If it gets control after IRRENV00, do not change

the content of the command buffer as doing so may result in the information not being processed correctly by automatic command direction.

If the alias is changed to point to a front-end processor, it gets control prior to IRRENV00 when a command is issued as a TSO command. However, the preprocessor does not get control in all situations. For example, it does not get control for commands resulting from automatic command direction, or for commands issued from the RACF parameter library.

One possible approach to avoid the pitfalls mentioned above is to include your front-end processor in RACF's load module.

```
INCLUDE mylib(mymod)
INCLUDE SYSLMOD(ICHCAG00)
ENTRY mymod
NAME IHCAG00(R)
```

After completing its processing, the front-end processor will need to call the entry point for RACF's command processor. If the front-end processor needs to communicate with the user, be aware that the preprocessor could be running in the RACF subsystem address space and not in the TSO user's address space. The ACEERASP bit (x'40') is set in the ACEEFLG3 flag field of the ACEE for the RACF subsystem address space.

Assigning the entry point to the front-end processor (mymod) causes it to be invoked at the same point in the processing that the specific command processing would have been invoked by RACF. Because the alias is not included, the RACF remote sharing functions will operate and IRRENV00 will be invoked.

The DEBUG command

The DEBUG command starts the diagnostic print statements that wrap the BSAFE calls and displays additional diagnostic information for RACDCERT invoked ICHEINTY ALTER, RACROUTE REQUEST=EXTRACT, and RACROUTE REQUEST=DEFINE failures. However, the contents of these messages will not be documented in any publication. When a problem is encountered, customers can use this keyword to gather diagnostic information for the IBM Support Center.

Chapter 7. Error recovery for RACF sysplex data sharing

This chapter describes actions to take in order to allow RACF to continue servicing requests when you encounter a situation where coupling facility recovery scenarios do not work properly.

Actions to recover from a coupling facility error

If you encounter a situation where coupling facility recovery scenarios do not work properly, the following information might make it possible for RACF to continue servicing requests.

For example, we assume a sysplex with 3 members: J90, J91, and J92. A coupling facility containing RACF Structure IRRXCF00_B001 has been lost. Member J90 remains active.

The following messages are received at the operator console:

```
IRRX016I RACF MEMBER J90 DETECTED A COUPLING FACILITY ERROR
IXC521I REBUILD FOR STRUCTURE IRRXCF00_B001 HAS BEEN STARTED
IRRX020I REBUILD FOR STRUCTURE IRRXCF00_B001 ON MEMBER J90 HAS BEEN INITIATED
```

The following message is not received at the operator console:

```
IRRX008I REBUILD FOR STRUCTURE IRRXCF00_B001 HAS BEEN COMPLETED
```

Issuing the following command from the operator console:

```
DISPLAY XCF,STRUCTURE
```

displays the following: IRRXCF00_B001 ALLOCATED REBUILDING

Issuing the following command from the operator console:

```
DISPLAY GRS,CONTENTION
```

displays the following: SYSZRAC2 , minor name backup-racf-db is held on system J90 by RACFDS

In this situation, members of the sysplex might be unable to function properly because RACF is holding enqs. A rebuild of a RACF structure has been requested but cannot go forward. The following steps might be helpful in allowing RACF to continue operating, though it will be at a degraded mode.

1. Make sure if message IXC402D has been received one or more times at the operator's console, you reply "down" to all of them. If this allows REBUILD to complete, you do not need to continue with the following steps.
2. Issue the following command at the operator console:

```
SETXCF STOP,REBUILD,STRNAME=IRRXCF00_B001
```

This command stops REBUILD and release enqs. Additionally, message IRRX004I is received, which displays the following: IRRX004I MEMBER J90 IS IN READ-ONLY MODE.

3. Issue the following command at the operator console:

```
RVARY NODATASHARE
```

All remaining sysplex members now operate off of the database, without the coupling facility. Note that performance will not be as good while running without the coupling facility.

4. You might be able to further improve the situation if you have configured your sysplex appropriately. This means that you have more than one coupling facility and that after the failure of one of them is still available. To illustrate this, read the following:

Take, for example, two coupling facilities. All structures for the primary RACF database are assigned to one coupling facility and all structures for the backup RACF database are assigned to the other coupling facility. (In this example, assume that no alternate coupling facilities have been assigned.) If you lose one or the other of the coupling facilities in this configuration, you can still get back into data sharing mode, though it will be without a backup database.

For example:

- If the coupling facility containing the primary database structures goes down, issue the command:

```
RVARY SWITCH
```

which makes the backup database primary and deactivates the old primary database.

- If the coupling facility containing the backup database structures goes down, issue the command:

```
RVARY INACTIVE
```

on the backup database.

- Issue the command:

```
RVARY DATASHARE
```

which allows remaining sysplex members the ability to connect to all structures on the available coupling facility.

The fourth step has an adverse consequence, however. Although these steps improve performance while a coupling facility is unavailable, your backup and primary databases will most likely become out of synch. This will need to be resolved before you can go back to normal operations with both primary and backup databases. This can be done by using IRRUT200, as documented in *z/OS Security Server RACF System Programmer's Guide*.

Appendix A. The Inventory Control Block (ICB)

The ICB is included here to help you diagnose RACF problems.

Common Name: RACF Database Inventory Control Block
Macro ID: ICHPICB
DSECT Name: INVICB
Owning Component: Resource Access Control Facility (XXH00)
Eye-Catcher ID: RACFICB
 Offset: 1010
 Length: 8

Storage Attributes:

Subpool: 231
Key: 0
Residency: ECSA

Size: 4096 bytes

Created by: IRRMIN00 or IRRUT400 on the RACF database. In storage by RACF initialization when the system is in data sharing mode or if the database is not shared.

Pointed to by: DSDEHDR in the DSDT data area

Serialization: For the copy on the data set: SYSZRACF RESERVE or SYSZRACF ENQ
 For the in-storage copy: SYSZRACF ENQ

Function: The ICB is the first record of the RACF database. It provides a control area for the routines that manage RACF data. This control area contains information needed to locate data related to the templates.

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
0	(0)	STRUCTURE	4096	INVICB	Inventory Control Block
0	(0)	CHARACTER	2599	ICBHDR	
0	(0)	ADDRESS	4	ICBCHAIN	Reserved
4	(4)	SIGNED	4	ICBBAMNO	Number of BAM blocks in data set
8	(8)	BITSTRING	6	ICCIBRBA	RBA of highest level CIB
14	(E)	BITSTRING	6	ICISSRBA	RBA of first block of index sequence set
20	(14)	BITSTRING	6	ICBAMRBA	RBA of first BAM
26	(1A)	BITSTRING	1	ICBFLAGS	Status
		1...		ICBEXTND	RACF data set has been extended, RACF will no longer process updates to this version
		.1..		ICBUPDAT	VSAMDSET group must be updated
		..1.		ICBEDAT	RESIDENT data blocks option used on some system
		...1		ICBDSFMT	1 = new RACF data set format
		.... 1...		ICBWIP	HPCS 1 = Write In Progress
		.... .111		*	Reserved
27	(1B)	ADDRESS	1	ICTMPCNT	Number of templates
28	(1C)	BITSTRING	6	ICBAMHWM	BAM HWM.
34	(22)	CHARACTER	16	ICBTEMP (10)	Space for 10 template DEFNS
34	(22)	SIGNED	2	ICTMPL	Template length
36	(24)	ADDRESS	1	ICTMPN	Template number
37	(25)	BITSTRING	1	ICTMRSV1	Align to half word boundary
38	(26)	BITSTRING	6	ICTMPRBA	RBA of FDT

ICB

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
44	(2C)	CHARACTER	6	ICTMRSV2	Reserved
194	(C2)	CHARACTER	1	ICBSTAT	Status
		1... ..		*	Reserved, do not use. Maps the 'RCVTRNA' flag
		.1..		ICBNLS	Bypass RACINIT statistics
		..1.		ICBNDSS	Bypass data set statistics
		...1		ICBNTVS	No tape volume statistics
		.... 1...		ICBNDVS	No direct access volume statistics
		.... .1..		ICBNTMS	No terminal statistics
		.... ..1.		ICBNADS	No ADSP protection
		.... ...1		ICBEGN	EGN support in effect
195	(C3)	BITSTRING	1	ICBEXTA	Reserved
196	(C4)	CHARACTER	1	ICBSTAT1	
		1... ..		ICBTAPE	Tape volume protection
		.1..		ICBDASD	DASD volume protection
		..1.		ICBDGEN	Generic profiles for dataset class
		...1		ICBDGCM	Generic commands for dataset class
		.... 1...		ICBRDSN	Input data set name will be used for logging and messages
		.... .1..		ICBJXAL	JES-XBMALLRACF is in effect
		.... ..1.		ICBJCHK	JES-EARLYVERIFY is in effect
		.... ...1		ICBJALL	JES-BATCHALLRACF is in effect
197	(C5)	CHARACTER	1	ICBAUOP	RACF audit options
		1... ..		*	Reserved
		.1..		ICBAGRO	Audit GROUP class
		..1.		ICBAUSE	Audit USER class
		...1		ICBADAT	Audit DATASET class
		.... 1...		ICBADAS	Audit DASDVOL class
		.... .1..		ICBATAP	Audit TAPEVOL class
		.... ..1.		ICBATER	Audit TERMINAL class
		.... ...1		ICBAOPR	Audit OPERATIONS attribute
198	(C6)	BITSTRING	1	ICBAXTA	Reserved
199	(C7)	CHARACTER	1	ICBEROP	Miscellaneous options
		1... ..		ICBTERP	Terminal authorization checking
		.1..		ICBTUAC	Default UACC for terminals not defined to RACF. If ON, UACC = NONE. If OFF, UACC = READ.
		..1.		ICBAVIO	Do not create log record for command violations only
		...1		ICBSAUD	Do not audit SPECIAL users
		.... 1...		ICBMGDG	MODEL-GDG in effect
		.... .1..		ICBMUSR	MODEL-USER in effect
		.... ..1.		ICBMGRP	MODEL-GROUP in effect
		.... ...1		ICBLGRP	LIST-OF-GRPS in effect
200	(C8)	SIGNED	4	ICBCHCT (10)	Change count array for all levels of index blocks

	Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
I	220	(DC)	ADDRESS	4	RCVTEIMR	Pointer to EIM regisry
	240	(F0)	ADDRESS	1	CBPINV	Global max password interval value, valid range 1-254
	241	(F1)	BITSTRING	4	ICBCSTA	Class STATISTICS mask
	245	(F5)	BITSTRING	4	ICBCAUD	Class AUDIT mask
	249	(F9)	BITSTRING	4	ICBCPRO	Class PROTECTION mask
	253	(FD)	UNSIGNED	1	ICBPHIST	Password HISTORY value
	254	(FE)	UNSIGNED	1	ICBPRVOK	Password REVOKE value
	255	(FF)	UNSIGNED	1	ICBPWARN	Password WARNING value
	256	(100)	CHARACTER	10	ICBPSYN (8)	Password SYNTAX rules
	256	(100)	UNSIGNED	1	ICBPSLEN	Starting length value
	257	(101)	UNSIGNED	1	ICBPELEN	Ending length value
	258	(102)	CHARACTER	8	ICBPRULS	Content rules
	258	(102)	CHARACTER	1	ICBPRUL1	Content rule
	259	(103)	CHARACTER	1	ICBPRUL2	Content rule
	260	(104)	CHARACTER	1	ICBPRUL3	Content rule
	261	(105)	CHARACTER	1	ICBPRUL4	Content rule
	262	(106)	CHARACTER	1	ICBPRUL5	Content rule
	263	(107)	CHARACTER	1	ICBPRUL6	Content rule
	264	(108)	CHARACTER	1	ICBPRUL7	Content rule
	265	(109)	CHARACTER	1	ICBPRUL8	Content rule
	336	(150)	UNSIGNED	1	ICBINACT	INACTIVATE interval
	337	(151)	BITSTRING	4	ICBCGEN	Generic profile checking, class mask
	341	(155)	BITSTRING	4	ICBCGCM	Generic commansd processing, class mask
	345	(159)	BITSTRING	4	ICBMOPT	Miscellaneous options
		1... ..			ICBFPDS	Fastpath for DATASET class
		.1..			ICBTDSN	Tape data set protection in effect
		..11 1111			*	Reserved
		1... ..			ICBPRO	PROTECT-ALL is in effect
		.1..			ICBPROF	1 - PROTECT-ALL WARNING is in effect, 0 - PROTECT-ALL FAILURE is in effect (This flag os ognored if ICBPRO has a value of '0'B)
		..1.			ICBEOS	ERASE-ON-SCRATCH is in effect
		...1			ICBEOSL	ERASE-ON-SCRATCH by SECLEVEL is in effect (This flag is ignored if ICBEOS has a value of '0'B)
		.... 1...			ICBEOSA	ERASE-ON-SCRATCH for all data sets is in effect (This flag is ignored if ICBEOS has a value of '0' B)
		.... .111			*	Reserved
		1... ..			ICBPROG	PROGRAM CONTROL is in effect
	347	(15B)	BITSTRING	1	*	Reserved
	349	(15D)	BITSTRING	4	ICBFPTH	Class FASTPATH mask
	353	(161)	UNSIGNED	1	ICBSLVL	Security Level for ERASE-ON-SCRATCH
	354	(162)	UNSIGNED	2	ICBRETP	Security Retention Period

ICB

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
356	(164)	UNSIGNED	1	ICBQLLN	Length of prefix for single level data set names
357	(165)	CHARACTER	9	ICBQUAL	Installation controlled prefix for single level dataset names, plus period for level
366	(16E)	UNSIGNED	1	ICBSLAU	SECLEVEL to audit
367	(16F)	UNSIGNED	1	ICBALIAS	367 (16F) UNSIGNED 1 ICBALIAS application identity mapping byte. 4 stages: <ul style="list-style-type: none"> • 0=stage 0 <ul style="list-style-type: none"> – not active – only mapping profiles • 1=stage 1 <ul style="list-style-type: none"> – active – maintain alias index, but also maintain and use VLF and mapping profiles – Reject locates of application identities • 2=stage 2 <ul style="list-style-type: none"> – active – maintain and use alias index, but also maintain VLF the mapping profiles – Allow locates of application identities • 3=stage 3 <ul style="list-style-type: none"> – active – maintain and use only alias index – mapping profiles have been removed
368	(170)	SIGNED	4	ICBCHCTD	Change count for data blocks, used to maintain current in-storage blocks with a shared RACF data set
372	(174)	CHARACTER	8	ICBSWPW	Password for RVARV SWITCH command
380	(17C)	CHARACTER	8	ICBINPW	Password for RVARV ACTIVE/INACTIVE command
388	(184)	BITSTRING	16	ICBLRCL	CDT-ANCHORED RACLSTED profile class mask, ON if active
404	(194)	BITSTRING	16	ICBLGNL	CDT-ANCHORED GENLISTED profile class mask, ON if active
420	(1A4)	BITSTRING	16	ICBLSTAC	Class STATISTICS option mask long version, ON if active
436	(1B4)	BITSTRING	16	ICBLAUDC	Class AUDITING option mask long version, ON if active
452	(1C4)	BITSTRING	16	ICBLPROC	Class PROTECTION option mask long version, ON if active

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
468	(1D4)	BITSTRING	16	ICBLGENC	Class mask for GENERIC PROFILE CHECKING long version, ON if active
484	(1E4)	BITSTRING	16	ICBLGCMC	Class mask for GENERIC COMMAND CHECKING long version, ON if active
500	(1F4)	BITSTRING	16	ICBLFPTC	Class FASTPATH option mask long version, ON if active
516	(204)	CHARACTER	1	*	Reserved; Prevent byte skip msg
517	(205)	ADDRESS	1	ICNTMPCT	Number of nre templates
518	(206)	CHARACTER	16	ICBNTEMP (10)	Space for 10 template definitions
518	(206)	SIGNED	2	ICTMPNL	Template length
520	(208)	ADDRESS	1	ICTMPNN	Template number
521	(209)	BITSTRING	1	ICTMNRV1	Align to halfword boundry
522	(20A)	BITSTRING	6	ICTMNRBA	RBA of FDT
528	(210)	CHARACTER	6	ICTMNRV2	Reserved
678	(2A6)	BITSTRING	4	ICBVMSSP	VM 370 SYNC counter
682	(2AA)	BITSTRING	4	ICBVMSXA	VMXA ACI SYNC counter
686	(2AE)	CHARACTER	8	ICBBMAPA	VM XA profile name which contains the audit settings
694	(2B6)	CHARACTER	8	ICBBMAPP	VM XA profile name contains the project settings
702	(2BE)	CHARACTER	92	ICBBMAP	Saved copy of the ACI bit map located in the CP nucleus
702	(2BE)	BITSTRING	2	ICBMAPSZ	Length of the entire ACI bit map with uncompressed events
704	(2C0)	BITSTRING	1	ICBDIAL	Indicator for: DIAL CMND
705	(2C1)	BITSTRING	1	ICBPRMSG	Indicator for: DIAL CMND, PRELOGON MESSAGE CMD
706	(2C2)	BITSTRING	88	ICBEVENT	ACI bit map events
794	(31A)	SIGNED	2	ICBSINT	LU Session Interval
796	(31C)	BITSTRING	16	ICBLGAL	SETROPTS "LOGOPTIONS ALWAYS" class mask, ON if active
812	(32C)	BITSTRING	16	ICBLNVR	SETROPTS "LOGOPTIONS NEVER" class mask, ON if active
828	(33C)	BITSTRING	16	ICBLGSU	SETROPTS "LOGOPTIONS SUCCESSES" class mask, ON if active
844	(34C)	BITSTRING	16	ICBLGFL	SETROPTS "LOGOPTIONS FAILURES" class mask, ON if active
860	(35C)	CHARACTER	8	ICBJSYS	User ID from the SETROPTS command JES(NJEUSERID(<i>id</i>))
868	(364)	CHARACTER	8	ICBJUND	User ID from the SETROPTS command JES(UNDEFINEDUSER(<i>id</i>))
876	(36C)	SIGNED	4	ICBRCSN	RACF group data synchronization value
880	(370)	BITSTRING	1	ICBLOGD	LOGOPTIONS for DATASET
		1... ..		ICBDLGA	LOGOPTIONS "ALWAYS" for the DATASET class
		.1... ..		ICBDLGN	LOGOPTIONS "NEVER" FOR THE DATASET CLASS

ICB

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
		..1.		ICBDLGS	LOGOPTIONS "SUCCESSSES" for the DATASET class
		...1		ICBDLGF	LOGOPTIONS "FAILURES" for the DATASET class
		.... 1111		*	Reserved
881	(371)	BITSTRING	1	ICBFLG2X	RACF SETROPTS options
		1...		ICBCMPM	SETROPTS COMPATMODE, ON if active
		.1..		ICBMLSF	SETROPTS MLS FAILURES/WARNING - FAILURES if "ON" - (1) - WARNING if "OFF" - (0)
		..1.		ICBMLAF	SETROPTS MLACTIVE FAILURES/WARNING - FAILURES if "ON" - (1) - WARNING if "OFF" - (0)
		...1		ICBCATF	SETROPTS CATDSNS FAILURES/WARNING - FAILURES if "ON" - (1) - WARNING if "OFF" - (0)
		.... 1...		ICBAAPL	SETROPTS APPLAUDIT ON if active
		.... .1..		ICBNOADC	SETROPTS NOADDCREATOR - on if NOADDCREATOR in effect
		.... ..11		*	Reserved
882	(372)	CHARACTER	8	ICBSPAUD	VM/SP profile names which contains the audit settings
890	(37A)	CHARACTER	8	ICBSPCTL	VM/SP profile names which contains the protect settings
898	(382)	BITSTRING	1	ICBFLG2	RACF 1.9.0 SETROPTS options
		1...		ICBSLCL	SETROPTS SECLABELCONTROL - ON if active
		.1..		ICBCATD	SETROPTS CATDSNS - ON if active
		..1.		ICBMLQT	SETROPTS MLQUIET - ON if active
		...1		ICBMLST	SETROPTS MLSTABLE - ON if active
		.... 1...		ICBMLS	SETROPTS MLS - ON if active
		.... .1..		ICBMLAC	SETROPTS MLACTIVE - ON if active
		.... ..1.		ICBGNOW	SETROPTS GENERICOWNER - ON if active
		.... ...1		ICBAUSL	SETROPTS SECLABELAUDIT - ON if active
899	(383)	CHARACTER	3	ICBNL1	PRIMARY LANGUAGE default
902	(386)	CHARACTER	3	ICBNL2	SECONDARY LANGUAGE default
905	(389)	BITSTRING	1	ICBDIRT	Dirty bits to indicate whether fields have been initialized.
		1...		ICBSESS	SESSIONINTERVAL dirty bit, 0=>Field not initialized, 1=>Field is initialized.
		.111 1111		*	Reserved

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
906	(38A)	CHARACTER	86	*	Rerved
992	(3E0)	CHARACTER	6	ICBALRBA	Highest ALIAS index block
998	(3E6)	CHARACTER	6	ICBASRBA	ALIAS index sequence set
1004	(3EC)	ADDRESS	4	ICBSMCT	Count field to control purge of VLF class IRRSMAP
1008	(3F0)	CHARACTER	1	ICBKRBLV	SETROPTS KERBLVL setting
1009	(3F1)	CHARACTER	1	*	Reserved
1010	(3F2)	CHARACTER	8	ICBID	Identifier, gets filled in during IRRMIN00 initialization
1018	(3FA)	CHARACTER	6	ICBVRMN	Version/release/ modification number, also filled in IRRMIN00 End of first 1024 bytes
1024	(400)	SIGNED	2	ICTSEGLN	Length of segment table
1026	(402)	BITSTRING	6	ICTSEGRB	RBA of segment table
1032	(408)	BITSTRING	1	ICBRDSFL	RDS flags
		1... ..		ICBINITF	ICB was completely initialized by RDS IRRMIN00
		.111 1111		*	Reserved
1033	(409)	CHARACTER	3	*	Reserved; Prevent byte skip msg
1036	(40C)	UNSIGNED	4	ICBUSCT	ACEE data repository change count for user profile
1040	(410)	UNSIGNED	4	ICBGPCT	ACEE data repository change count for group profile
1044	(414)	UNSIGNED	4	ICBGRCT	ACEE data repository change count for general resource classes APPL, APPCPORT, JESINPUT, CONSOLE, TERMINAL, GTERMINL & SECLABEL
1048	(418)	ADDRESS	4	ICBUMCT	count field to control purge of VLF class IRRUMAP
1052	(41C)	ADDRESS	4	ICBGMCT	count field to control purge pf VLF class IRRGMAP
1056	(420)	CHARACTER	7	ICBTMPLV	Template level value filled in by IRRMIN00.
1063	(427)	BITSTRING	128	ICBVPROC	Class protection mask
1191	(4A7)	BITSTRING	128	ICBVGENC	Generic profile checking class mask
1319	(527)	BITSTRING	128	ICBVGCMC	Generic command processing class mask
1447	(5A7)	BITSTRING	128	ICBVRCL	CDT-anchored RACLSTed profile class mask
1575	(627)	BITSTRING	128	ICBVGNL	CDT-anchored GENLISTed profile class mask
1703	(6A7)	BITSTRING	128	ICBFVPTC	Fastpath option class mask
1831	(727)	BITSTRING	128	ICBVAUDC	Auditing option class mask
1959	(7A7)	BITSTRING	128	ICBVSTAC	Statistics option mask
2087	(827)	BITSTRING	128	ICBVLGA	SETROPTS LOGOPTIONS ALWAYS class mask
2215	(8A7)	BITSTRING	128	ICBVLNV	SETROPTS LOGOPTIONS NEVER class mask
2343	(927)	BITSTRING	128	ICBVLGS	SETROPTS LOGOPTIONS SUCCESSES class mask

ICB

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
2471	(9A7)	BITSTRING	128	ICBVLGF	SETROPTS LOGOPTIONS FAILURES class mask
2599	(A27)	CHARACTER	1497	ICBRSVD	RESERVED

End of ICB mapping

Constants

Len	Type	Value	Name	Description
8	CHARACTER	RACFICB	ICBIDC	Constant for ICBID field
6	CHARACTER	1090	ICB1090	Constant representing FMID HRF1902 for ICBVRMN field
6	CHARACTER	1092	ICB1092	Constant representing FMID JRF1922 for ICBVRMN field
6	CHARACTER	2010	ICB2010	Constant representing FMID HRF2210 for ICBVRMN field
6	CHARACTER	2020	ICB2020	Constant representing FMID HRF2220 for ICBVRMN field
6	CHARACTER	2030	ICB2030	Constant representing FMID HRF2230 for ICBVRMN field
6	CHARACTER	2040	ICB2040	Constant representing FMID HRF2240 for ICBVRMN field
6	CHARACTER	2060	ICB2060	Constant representing FMID HRF2260 for ICBVRMN field
6	CHARACTER	2608	ICB2608	Constant representing HRF2608 for ICBVRMN field
6	CHARACTER	7703	ICB7703	Constant representing HRF7703 for ICBVRMN field
6	CHARACTER	7705	ICB7705	Constant representing HRF7705 for ICBVRMN field
6	CHARACTER	7707	ICB7707	Constant representing HRF7707 for ICBVRMN field

Cross Reference

Name	Hex Offset	Hex Value	Level
ICBAAPL	371	08	4
ICBADAS	C5	08	4
ICBADAT	C5	10	4
ICBAGRO	C5	40	4
ICBALIAS	16F		3
ICBALRBA	3E0		3
ICBAMHWM	1C		3
ICBAMRBA	14		3
ICBAOPR	C5	01	4
ICBASRBA	3E6		3
ICBATAP	C5	04	4
ICBATER	C5	02	4
ICBAUOP	C5		3
ICBAUSE	C5	20	4
ICBAUSL	382	01	4
ICBAVIO	C7	20	4
ICBAXTA	C6		3
ICBBAMNO	4		3
ICBBMAP	2BE		3
ICBBMAPA	2AE		3
ICBBMAPP	2B6		3
ICBCATD	382	40	4
ICBCATF	371	10	4
ICBCAUD	F5		3

ICB

Name	Hex Offset	Hex Value	Level
ICBCGCM	155		3
ICBCGEN	151		3
ICBCHAIN	0		3
ICBCHCT	C8		3
ICBCHCTD	170		3
ICBCMPM	371	80	4
ICBCPRO	F9		3
ICBCSTA	F1		3
ICBDASD	C4	40	4
ICBDGCM	C4	10	4
ICBDGEN	C4	20	4
ICBDIAL	2C0		4
ICBDIRT	89		3
ICBDLGA	370	80	4
ICBDLGF	370	10	4
ICBDLGN	370	40	4
ICBDLGS	370	20	4
ICBDSFMT	1A	10	4
ICBEDAT	1A	20	4
ICBEGN	C2	01	4
ICBEOS	15A	20	4
ICBEOSA	15A	08	4
ICBEOSL	15A	10	4
ICBEROP	C7		3
ICBEVENT	2C2		4
ICBEXTA	C3		3
ICBEXTND	1A	80	4
ICBFLAGS	1A		3
ICBFLG2	382		3
ICBFLG2X	371		3
ICBFPDS	159	80	4
ICBFPTH	15D		3
ICBGMCT	41C		3
ICBGNOW	382	02	4
ICBGPCT	410		3
ICBGRCT	414		3
ICBHDR	0		2
ICBID	3F2		3
ICBINACT	150		3
ICBINITF	408	80	4
ICBINPW	17C		3
ICBJALL	C4	01	4
ICBJCHK	C4	02	4
ICBJSYS	35C		3
ICBJUND	364		3
ICBJXAL	C4	04	4
ICBKRLV	3F0		3
ICBLAUDC	1B4		3
ICBLFPTC	1F4		3
ICBLGAL	31C		3
ICBLGCMC	1E4		3
ICBLGENC	1D4		3
ICBLGFL	34C		3

ICB

Name	Hex Offset	Hex Value	Level
ICBLGNL	194		3
ICBLGRP	C7	01	4
ICBLGSU	33C		3
ICBLNVR	32C		3
ICBLOGD	370		3
ICBLPROC	1C4		3
ICBLRCL	184		3
ICBLSTAC	1A4		3
ICBMAPSZ	2BE		4
ICBMGDG	C7	08	4
ICBMGRP	C7	02	4
ICBMLAC	382	04	4
ICBMLAF	371	20	4
ICBMLQT	382	20	4
ICBMLS	382	08	4
ICBMLSF	371	40	4
ICBMLST	382	10	4
ICBMOPT	159		3
ICBMUSR	C7	04	4
ICBNADS	C2	02	4
ICBNDSS	C2	20	4
ICBNDVS	C2	08	4
ICBNLS	C2	40	4
ICBNL1	383		3
ICBNL2	386		3
ICBNOADC	371	04	4
ICBNTEMP	206		3
ICBNTMS	C2	04	4
ICBNTVS	C2	10	4
ICBPELEN	101		4
ICBPHIST	FD		3
ICBPINV	F0		3
ICBPRMSG	2C1		4
ICBPRO	15A	80	4
ICBPROF	15A	40	4
ICBPROG	15B	80	4
ICBPRULS	102		4
ICBPRUL1	102		5
ICBPRUL2	103		5
ICBPRUL3	104		5
ICBPRUL4	105		5
ICBPRUL5	106		5
ICBPRUL6	107		5
ICBPRUL7	108		5
ICBPRUL8	109		5
ICBPRVOK	FE		3
ICBPSLEN	100		4
ICBPSYN	100		3
ICBPWARN	FF		3
ICBQLLN	164		3
ICBQUAL	165		3
ICBRCGSN	36C		3
ICBRDSFL	408		3

ICB

Name	Hex Offset	Hex Value	Level
ICBRDSN	C4	08	4
ICBRETP	162		3
ICBRSVD	A27		2
ICBSAUD	C7	10	4
ICBSESS	389	80	4
ICBSINT	31A		3
ICBSLAU	16E		3
ICBSLCL	382	80	4
ICBSLVL	161		3
ICBSMCT	3EC		3
ICBSPAUD	372		3
ICBSPCTL	37A		3
ICBSTAT	C2		3
ICBSTAT1	C4		3
ICBSWPW	174		3
ICBTAPE	C4	80	4
ICBTDSN	159	40	4
ICBTEMP	22		3
ICBTERP	C7	80	4
ICBTMPLV	420		3
ICBTUAC	C7	40	4
ICBUMCT	418		3
ICBUPDAT	1A	40	4
ICBUSCT	40C		3
ICBVAUDC	727		3
ICBFPTC	6A7		3
ICBVGCMC	527		3
ICBVGENC	4A7		3
ICBVGNL	627		3
ICBVLGA	827		3
ICBVLGF	9A7		3
ICBVLGS	927		3
ICBVLNV	8A7		3
ICBVMSSP	2A6		3
ICBVMSXA	2AA		3
ICBVPROC	427		3
ICBVRCL	5A7		3
ICBVRMN	3FA		3
ICBVSTAC	7A7		3
ICBWIP	1A	08	4
ICIBRBA	8		3
ICISSRBA	E		3
ICNTMPCT	205		3
ICTMNRBA	20A		4
ICTMNRV1	209		4
ICTMNRV2	210		4
ICTMPCNT	1B		3
ICTMPL	22		4
ICTMPN	24		4
ICTMPNL	206		4
ICTMPNN	208		4
ICTMPRBA	26		4
ICTMRSV1	25		4

ICB

Name	Hex Offset	Hex Value	Level
ICTMRSV2	2C		4
ICTSEGLN	400		3
ICTSEGRB	402		3
INVICB	0		1

Appendix B. The Security Product Trace Area (SAFT)

The SAFT is included here to help you diagnose RACF problems.

Common Name: RACF Security Product Trace Area Control Block
Macro ID: IRRSAFT
DSECT Name: SAFT
Owning Component: Resource Access Control Facility (SC1BN)
Eye-Catcher ID: SAFT
 Offset: 0
 Length: 4

Storage Attributes:

Subpool: 245
Key: 0
Residency: SQA

Size: 200 bytes
Created by: ICHSEC07 during RACF initialization.
Pointed to by: SAFVSECT in the SAFV data area
Serialization: This control block is serialized with SYSZRAC2 ENQ.
Function: The SAFT provides a communication area for information global to the SAF Trace utility.

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
0	(0)	STRUCTURE		SAFT	IRRSAFT Control Block
0	(0)	CHARACTER	4	SAFTID	SAFT eyecatcher
4	(4)	UNSIGNED	1	SAFTVRSN	Version Number
5	(5)	CHARACTER	3	*	RESERVED
8	(8)	UNSIGNED	1	SAFTSUBP	Storage subpool
9	(9)	UNSIGNED	3	SAFTLENG	Length of SAFT
12	(C)	UNSIGNED	4	SAFTTRCO	Trace routine address
16	(10)	UNSIGNED	4	SAFTTRPC	Trace routine PC number
20	(14)	BITSTRING	4	SAFTTRAC	RACF trace flags
20	(14)	BITSTRING	1	SAFTTACT	RACF trace flags
		1...		SAFTACTV	A trace is active
		.1..		SAFTRRTE	Trace racroute events
		..1.		SAFTMGRT	Trace DB manager events
		...1		SAFTSYSC	Trace system calls
		.... 1...		SAFTSYSZ	Trace SAF3 calls
		.... .111		*	RESERVED
21	(15)	BITSTRING	3	*	RESERVED
24	(18)	BITSTRING	8	SAFTRRTR	Racroute events
24	(18)	BITSTRING	1	*	
		1...		SAFTRALL	Trace all racroutes
		.1..		SAFTAUTH	SAFPREQT = 1 (Auth)
		..1.		SAFTFAUT	SAFPREQT = 2 (Fastauth)
		...1		SAFTLIST	SAFPREQT = 3 (List)
		.... 1...		SAFTDEFN	SAFPREQT = 4 (Define)
		.... .1..		SAFTVFY	SAFPREQT = 5 (Verify)
		.... ..1.		SAFTEXTR	SAFPREQT = 6 (Extract)

SAFT

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description	
25	(19)	.... ..1	1	SAFTDIR	SAFPREQT = 7 (Dirauth)
		BITSTRING		*		
		1...		SAFTTKSR	SAFPREQT = 8 (Token Serv)	
		.1..		SAFTVFX	SAFPREQT = 9 (VerifyX)	
		..1.		SAFTTEXT	SAFPREQT = A (Token Serv)	
		...1		SAFTTBLD	SAFPREQT = B (Token Bld.)	
		.... 1...		SAFTTXBR	SAFPREQT = C (Extract BR=Y)
		.... .1..		SAFTAUD	SAFPREQT = D (Audit)
		.... ..1.		SAFTTSTS	SAFPREQT = E (Status)
		.... ..1		SAFTSIGN	SAFPREQT = F (Signon)
26	(1A)	BITSTRING	1	*		
		1...		SAFTMPX	SAFPREQT = 10 (Tmap Xmem)	
		.1..		SAFTTXTX	SAFPREQT = 11 (Text Xmem)	
		..11 1111		*	RESERVED	
27	(1B)	BITSTRING	5	*	RESERVED	
32	(20)	BITSTRING	16	SAFTSCLS	Trace RACF syscalls	
32	(20)	BITSTRING	1	*		
		1...		SAFTSALL	Trace all syscalls	
		.1..		SAFTSIU0	Init USP	
		..1.		SAFTSDU0	Delete USP	
		...1		SAFTSMF0	Make FSP	
		.... 1...		*	RESERVED
		.... .1..		SAFTSMM0	Set File Mode Creation Mask
		.... ..1.		SAFTSKA0	Check Access
		.... ..1		SAFTSKP0	Check Privilege
		BITSTRING		1	*	
		1...			SAFTSUM0	Get Umap
		.1..			SAFTSGM0	Get Gap
		..1.			SAFTSGG0	Get Supplemental Groups
...1	SAFTSSU0	Set Uid				
.... 1...	SAFTSEU0	Set Effective Uid				
.... .1..	SAFTSSG0	Set Gid				
.... ..1.	SAFTSEG0	Set Effective Gid				
.... ..1	SAFTSCO0	Change Owner Group				
34	(22)	BITSTRING	1	*		
		1...		SAFTSCF0	Change file mode	
		.1..		SAFTSCA0	Change file audit options	
		..1.		SAFTSEX0	Exec Set Uid, Gid	
		...1		SAFTSAU0	Audit	
		.... 1...		SAFTSKO0	Check Process owner
		.... .1..		SAFTSQS0	Query Security options
		.... ..1.		SAFTSQF0	Query File options
		.... ..1		SAFTSCS0	Clear SETID
		35		(23)	BITSTRING	1

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
		1...		SAFTSKF0	Check File Owner
		.1..		SAFTSMR0	Make Root FSP
		..1.		SAFTSPT0	Ptrace Authority Check
		...1		SAFTSUG0	Get User groups
		.... 1..		SAFTSFK0	Fork Exit
		.... .1..		SAFTSMI0	Make ISP
		.... ..1.		SAFTSKI0	Check IPC
		.... ...1		SAFTSCI0	IPC Control
36	(24)	BITSTRING	1	*	
		1...		SAFTSC20	Check Owner 2 Files
		.1..		SAFTSGE0	Get Euid/EGid SupGrp
		..1.		SAFTSDI0	R_dceinfo
		...1		SAFTSDK0	R_dcekey
		.... 1..		SAFTSUD0	R_dceruid
		.... .1..		SAFTSDA0	R_dceauth
		.... ..1.		SAFTSIA0	InitAcee
		.... ...1		SAFTSEQ0	RACF Admin Request
37	(25)	BITSTRING	1	*	
		1...		SAFTSIM0	User Map
		.1..		SAFTSDL0	R_datalib
		..1.		SAFTSMK0	Kerb
		...1		SAFTSPK0	Ticket Serve
		.... 1..		SAFTSPX0	R_PKIServ
		.... .1..		SAFTSCH0	R_cacheserv
		.... ..1.		SAFTSPY0	R_proxyserv
		.... ...1		SAFTSCL0	R_SetFacI
38	(26)	BITSTRING	10	*	RESERVED
48	(30)	BITSTRING	8	SAFTZCLS	Trace SAF3 calls
48	(30)	BITSTRING	1	*	
		1...		SAFTZALL	All SAF3 clls
		.1..		SAFTZA00	aznAccess
		..1.		SAFTSC00	aznCreds
		.... 1111		*	RESERVED
49	(31)	BITSTRING	7	*	RESERVED
56	(38)	BITSTRING	8	SAFTMTRC	Trace DB manager events
56	(38)	BITSTRING	1	*	
		1...		SAFTMLL	All DB manager event reads
		.1..		SAFTMRD	reads
		..1.		SAFTMALT	writes
		...1		SAFTMALI	alteri
		.... 1111		*	RESERVED
57	(39)	BITSTRING	7	*	RESERVED
64	(40)	ADDRESS	4	SAFTRRPR	Address of pre-function call indicator

SAFT

Offset (Dec)	Offset (Hex)	Type	Len	Name (Dim)	Description
68	(44)	ADDRESS	4	SAFTRRPS	Address of post-function call indicator
72	(48)	ADDRESS	4	SAFTSCPR	Address of pre-function call indicator
76	(4C)	ADDRESS	4	SAFTSCPS	Address of post-function call indicator
80	(50)	ADDRESS	4	SAFTZCPR	Address of pre-function call indicator
84	(54)	ADDRESS	4	SAFTZCPS	Address of post-function call indicator
88	(58)	ADDRESS	4	SAFTMGPR	Address of pre-function call indicator
92	(5C)	ADDRESS	4	SAFTMGPS	Address of post-function call indicator
96	(60)	ADDRESS	16	*	RESERVED
112	(70)	ADDRESS	4	SAFTALST	Trace ASID LIST
116	(74)	ADDRESS	4	SAFTJLST	Trace JOBS LIST
120	(78)	ADDRESS	16	*	RESERVED
136	(88)	CHARACTER	16	SAFTRRL	Flags to the security product
136	(88)	CHARACTER	8	SAFTRPRE	Pre process flag
144	(90)	CHARACTER	8	SAFTRPOS	Post process flag
152	(98)	CHARACTER	16	SAFTSCFL	Flags to the security product
152	(98)	CHARACTER	8	SAFTSPRE	Pre process flag
160	(A0)	CHARACTER	8	SAFTSPOS	Post process flag
168	(A8)	CHARACTER	16	SAFTZCFL	Flags to the PD product
168	(A8)	CHARACTER	8	SAFTZPRE	Pre process flag
176	(B0)	CHARACTER	8	SAFTZPOS	Post process flag
184	(B8)	CHARACTER	16	SAFTMGFL	Flags to the security product
184	(B8)	CHARACTER	8	SAFTMPRE	Pre process flag
192	(C0)	CHARACTER	8	SAFTMPOS	Post process flag

End of SAFT mapping

Appendix C. Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully. The major accessibility features in z/OS enable users to:

- Use assistive technologies such as screen-readers and screen magnifier software
- Operate specific or equivalent features using only the keyboard
- Customize display attributes such as color, contrast, and font size

Using assistive technologies

Assistive technology products, such as screen-readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.

Keyboard navigation of the user interface

Users can access z/OS user interfaces using TSO/E or ISPF. Refer to *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*, and *z/OS ISPF User's Guide Volume I* for information about accessing TSO/E and ISPF interfaces. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

Notices

This information was developed for products and services offered in the USA. IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
USA

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs

Notices

and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
Mail Station P300
2455 South Road
Poughkeepsie, NY 12601-5400
USA

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this information and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrates programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. You may copy, modify, and distribute these sample programs in any form without payment to IBM for the purposes of developing, using, marketing, or distributing application programs conforming to IBM's application programming interfaces.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

This product contains code licensed from RSA Data Security Incorporated.



Programming interface information

This *z/OS Security Server RACF Diagnosis Guide* documents information that is NOT intended to be used as a programming interface of z/OS.

Trademarks

The following terms are trademarks of the IBM Corporation in the United States or other countries or both:

BookManager
CICS
CICS/ESA
DB2
DFSORT
IBM
IBMLink
IMS
Library Reader
MVS
OS/390
RACF
Redbooks
Resource Link
RETAIN
S/390
SecureWay
System/390
TalkLink
VM/ESA
VTAM
z/OS
z/OS.e
zSeries

Lotus and Lotus Notes are trademarks of Lotus Development Corporation in the United States, other countries, or both.

NetView, TME, and Tivoli are trademarks of International Business Machines Corporation or Tivoli Systems Inc. in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other company, product, and service names may be trademarks or service marks of others.

Index

Special characters

??? state 140

A

abend
 example of search argument 38
 incorrect output 22
 troubleshooting tables 9
 VRA keys provided by RACF 217
 worksheet for reporting problems 98

abends
 troubleshooting table 9

accessibility 243

ACEE
 control block overview 207

ACTNPTR symptom in DAEDATA output 218

administration
 classroom courses xiv

alias index blocks
 description of 109

ALL keyword
 on BLKUPD LIST subcommand 125

APPC
 errors initializing connections 143
 obtaining trace records 48
 restarting a stopped task 144
 return code handling 144

application identity mapping
 examples 79
 handling 79
 IRRIRA00 79

ASID events
 obtaining trace records 48

ASXB control block overview 208

attention handling
 when using BLKUPD 121

AUDIT request
 parameter list 153

AUTH requests
 parameter list 154

B

BAM blocks
 block masks 107, 108
 description of 105, 107
 format of the header 107

BLKUPD command
 authority required for 120
 considerations 120
 DATA command procedure statement 121
 description of 120
 END subcommand 133
 ENDDATA command procedure statement 121
 examples 134
 invoking 122

BLKUPD command (*continued*)
 LOCATE subcommand 122
 locating an index entry 122
 READ subcommand 123
 syntax of 122
 terminating 133
 updating a RACF block 123

block update command (BLKUPD) 120

C

callable services
 error recording 190
 process flow 190

Callable Services
 dump title description 215
 tracing 51

caller of RACF, identifying 75

CHANGE subcommand of BLKUPD DISPLAY
 subcommand 128

checking the parameter list passed to RACF 77

class identifier
 adding to profile names 116

CLASS keyword
 on BLKUPD DISPLAY subcommand 127, 129, 130

classname
 on LOCATE subcommand of BLKUPD 123

classroom courses, RACF xiv

collecting problem data for RACF 41

command
 BLKUPD 120
 front-ending 219
 incorrect output 23
 trace records 49

command procedures
 executing BLKUPD under control of 121

command traces 49

COMP keyword
 on CHANGE subcommand of BLKUPD DISPLAY
 subcommand 129
 on INSERT subcommand of BLKUPD DISPLAY
 subcommand 131

component identification for RACF 36

compression count, front-end 112

connection state changes 139

connection states of RRSF nodes 139, 141

control block
 ACEE 207
 ASXB 208
 GRPF 207
 ICB 225
 inventory 225
 RCVT 207
 SAF router vector table 207
 task control block (TCB) 208

courses about RACF xiv

D

- D-B state 140
- D-E state 140
- D-L state 140
- D-R state 140
- daab 140
- daae 140
- daal 140
- daar 140
- DATA command procedure statement
 - when executing BLKUPD 121
- data encryption standard (DES)
 - algorithm 28
- database 119
 - BAM blocks 106
 - BLKUPD command 120
 - first record 225, 239
 - format 105
 - header block 106
 - how RACF creates and names profiles 116
 - incorrect output 25
 - index blocks 109, 110
 - index entries 111, 115
 - inventory control block (ICB) 225
 - IRRDBU00 utility 105
 - modifying with BLKUPD 120
 - security product trace area(SAFT) 239
 - sequence set chain pointers 115
 - tape volumes 116
 - templates 106
 - troubleshooting 105
 - types of records in
 - BAM blocks 105, 107
 - header block 105, 106
 - index blocks 105, 108, 109
 - profiles 105
 - templates 105, 106
 - unloading to a sequential file 105
 - using READ subcommand of BLKUPD to update a block 123
 - viewing with BLKUPD 120
- DATABASE events
 - obtaining trace records 48
- database profile
 - class identifier 116
 - description of templates 106
- database unload utility (IRRDBU00)
 - common problems 4
 - using 105, 119
- DEBUG command 221
- DEF state 140
- DEFINE request
 - parameter list 158
- defined state 140
- definition errors for RRSF 138
- DELETE subcommand
 - of BLKUPD READ DISPLAY subcommand 131
- DES (Data Encryption Standard)
 - algorithm 28
- diagnosis
 - hints 2
 - diagnosis (*continued*)
 - problems in racf 1
 - procedures for RACF 1
- DIRAUTH request
 - parameter list 164
- directed commands
 - process flow 183
- dirty bit 44
 - controlled programs 44
- disability 243
- DISPLAY subcommand of BLKUPD READ
 - subcommand 127
- distributed environment
 - types of errors 138
- documentation
 - troubleshooting table 19
- documentation error
 - example of search argument 38
 - worksheet for reporting problems 98
- documents, licensed xv
- dormant by local request state 140
- dormant by mutual request state 140
- dormant by remote request state 140
- dormant in error state 140
- DSECTs
 - INVICB 225
 - SAFT 239
- DSMON
 - incorrect output 23
- dump title descriptions
 - Callable Services 215
 - ICHRST00-RACF SVCS 208
 - IRRCOP10 module 211
 - IRRRLS12 module 211
 - IRRRLS13 module 212
 - IRRRLS14 module 212
 - IRRRLS15 module 213
 - RACF initialization failure 210
 - RACF persistent verification dumps 214
 - RACF subsystem dumps 213
 - RACF/DB2 external security module 216
 - SVC 208, 216
- DUPLICATE keyword
 - on CHANGE subcommand of BLKUPD DISPLAY subcommand 129
 - on INSERT subcommand of BLKUPD DISPLAY subcommand 131

E

- END subcommand
 - of BLKUPD command 133
 - of BLKUPD DISPLAY subcommand 132
 - of BLKUPD READ subcommand 133
- ENDDATA command procedure statement
 - when executing BLKUPD 121
- ENTRY keyword
 - on BLKUPD DISPLAY subcommand 127
 - on CHANGE subcommand of BLKUPD DISPLAY subcommand 128

ENTRY keyword (*continued*)
 on INSERT subcommand of BLKUPD DISPLAY
 subcommand 130
 entryname
 on LOCATE subcommand of BLKUPD 122
 environmental errors for RRSF 138
 error recording
 for callable services 190
 for RRSF 146
 error recovery for RACF sysplex data sharing
 actions 223
 consequences 224
 errors
 definition errors for RRSF 138
 environmental errors for RRSF 138
 program errors for RRSF 138
 transmission/line errors 138
 errors in a distributed environment 138
 ESTAE processing for RRSF 142
 EXTRACT request
 parameter list 164

F

failure keywords
 for a complete search 78
 for a preliminary search 34
 failure of an MVS system service 142
 FASTAUTH request
 parameter list 167
 FIND subcommand of READ subcommand of
 BLKUPD 124
 finding RACF information xiii
 FMIDs for RACF 39
 format of the RACF database 105
 FORMAT subcommand of BLKUPD READ
 subcommand
 format of 126
 list of the information displayed 126
 FRACHECK macro
 equivalent RACROUTE REQUEST type 149
 free-format search
 examples of symptoms for RACF 35, 78
 front-end compression count 112
 front-ending commands 219
 front-ending processor 219

G

general macro
 common problems 6
 GENERIC keyword
 on BLKUPD DISPLAY subcommand 128
 on CHANGE subcommand of BLKUPD DISPLAY
 subcommand 129
 on INSERT subcommand of BLKUPD DISPLAY
 subcommand 130
 on LOCATE subcommand of BLKUPD 123
 GRPF control block overview 207
 GTF traces 43, 44, 48

H

handshaking 139
 header
 for BAM blocks 107
 for index blocks 110, 111
 header block
 description of 105, 106
 fields in 225, 239
 format 106

I

ICB (inventory control block)
 description of 105, 106
 fields in 225
 format 106
 ICHEINTY macro
 common problems 6
 parameter list 179
 ICHRST00 module
 dump title for certain abends 208
 ICHSEC00 module
 dump title for certain abends 210
 RACF initialization failure 210
 ICHSEC02 module
 dump title for initialization failure 210
 identifying
 the caller of RACF 75
 IMAGE events
 obtaining trace records 48
 IMS (Information Management System)
 process flow for use of RACF 189
 incorrect output
 example of search argument 38
 troubleshooting table 20
 worksheet for reporting problems 98
 independent RACF system macros
 equivalent RACROUTE REQUEST types 149
 index blocks
 compression of index entries 112
 description of 105, 108, 109
 format of 109, 110
 header 110, 111
 index entries 111, 115
 sequence set chain pointers 115
 how profiles are located 108, 109
 information listed by the FORMAT
 subcommand 126
 index entries
 compression of 112
 format of 111
 locating in a sequence set 122
 index entry table
 sequence set chain pointers 116
 index structure
 example of 109
 Information/Access
 use for RACF problem searches 35
 Information/Management
 use for RACF problem searches 35

- Information/MVS
 - use for RACF problem searches 35
- Information/System
 - use for RACF problem searches 35
- initial state 140
- initialization problem
 - dump title for initialization failure 210
- INMSG data set for RRSF 137, 139
- INSERT subcommand of BLKUPD DISPLAY
 - subcommand 130
- installation exit
 - process flow 185
- inventory control block (ICB)
 - description of 105
 - fields in 225
 - format of 105
- INVICB DSECT 225
- IPCS (interactive problem control system) 9
- IPLPTR symptom in DAEDATA output 218
- IRRBRW00 utility 146
- IRRCOP10 module
 - dump title for failed data space 211
- IRRDBU00 utility
 - common problems 4
 - using database unload utility 105
- IRRENV00 module 219
- IRRRID00 utility
 - common problems 5
 - process flow 187
- IRRRLS12 module
 - dump title for COPY RACGLIST 211
- IRRRLS13 module
 - dump title for CREATE RACGLIST 212
- IRRRLS14 module
 - dump title for DELETE RACGLIST 212
- IRRRLS15 module
 - dump title for data space recovery failure 213
- IRRSSC01 module
 - dump title for RACF subsystem 213
- IRRSSS01 module
 - dump title for RACF subsystem 213
- IRRTEMP1 member of SYS1.MACLIB
 - used by IRRMIN00 106
- IRRUT100 utility
 - common problems 3
- IRRUT200 utility
 - common problems 3
- IRRUT400 utility
 - common problems 4

J

- JOBNAME events
 - obtaining trace records 48

K

- keyboard 243

L

- level of failing module 79
- licensed documents xv
- LIST request
 - parameter list 168
- LIST subcommand of BLKUPD READ subcommand
 - format of 125
- LISTALL keyword
 - on LOCATE subcommand of BLKUPD 123
- LOCATE subcommand of BLKUPD
 - format of 122
 - locating an index entry 122
- logon problems 28
 - troubleshooting table 28
 - worksheet for reporting problems 99
- LOGREC data set entries
 - for callable services errors 190
 - for RRSF errors 146
- LookAt message retrieval tool xv
- loop
 - diagnostic procedures 29
 - example of search argument 38
 - troubleshooting table 29
 - worksheet for reporting problems 100

M

- macros
 - checking parameter lists 77
 - ICHPICB 225
 - incorrect output 27
 - IRRSAFT 239
 - process flow 184
 - return codes 33
- masks
 - block masks in the RACF database 107, 108
- matching problem
 - searching for a 78
- message
 - example of search argument 38
 - troubleshooting table 29
 - worksheet for reporting problems 101
- message retrieval tool, LookAt xv
- messages
 - incorrect output 21
- MGRREQST symptom in DAEDATA output 218
- MVS router
 - parameter list 150

N

- NEW keyword
 - on FIND subcommand 125
 - on FORMAT subcommand 126
 - on LIST subcommand 125
- NEXT subcommand of BLKUPD READ DISPLAY
 - subcommand 131
- nodes, RRSF
 - connection states 139
 - connection states after TARGET 141

NODUPLICATE keyword
 on CHANGE subcommand of BLKUPD DISPLAY
 subcommand 129
 on INSERT subcommand of BLKUPD DISPLAY
 subcommand 131
non-VSAM data set
 used for the RACF database 105
NOSAVE keyword
 on BLKUPD END subcommand 133
 on END subcommand of BLKUPD DISPLAY
 subcommand 132
not defined state 140

O

O–A state 140
O–E state 140
O–P–C state 139
O–P–V state 140
OFFSET keyword
 on BLKUPD REPLACE subcommand 127
OLD keyword
 on BLKUPD FIND subcommand 125
 on BLKUPD FORMAT subcommand 126
 on BLKUPD LIST subcommand 125
operative active state 140
operative in error state 140
operative pending connection state 139
operative pending verification state 140
OUTMSG data set for RRSF 137, 139
output, incorrect
 troubleshooting table 20
 worksheet for reporting problems 98

P

PADS (program access to data sets) 44
parameter list
 AUDIT service 153
 AUTH service 154
 checking 77
 cross reference for RACROUTE REQUEST
 types 149
 DEFINE service 158
 descriptions 149
 DIRAUTH service 164
 EXTRACT service 164
 FASTAUTH service 167
 ICHEINTY 179
 list passed to RACF 77
 LIST service 168
 MVS router 150
 obtaining 43, 48
 RACROUTE 150
 RACROUTE REQUEST=AUDIT 153
 RACROUTE REQUEST=AUTH 154
 RACROUTE REQUEST=DEFINE 158
 RACROUTE REQUEST=DIRAUTH 164
 RACROUTE REQUEST=EXTRACT 164
 RACROUTE REQUEST=FASTAUTH 167
 RACROUTE REQUEST=LIST 168

parameter list (*continued*)
 RACROUTE REQUEST=SIGNON 169
 RACROUTE REQUEST=STAT 170
 RACROUTE REQUEST=TOKENBLD 170
 RACROUTE REQUEST=TOKENEXTR 174
 RACROUTE REQUEST=TOKENMAP 174
 RACROUTE REQUEST=VERIFY 175
 RACROUTE REQUEST=VERIFYX 175
 SAF router 150
 SIGNON service 169
 STAT service 170
 TOKENBLD service 170
 TOKENEXTR service 174
 TOKENMAP service 174
 VERIFY service 175
 VERIFY/VERIFYX service parameter list 175
 VERIFYX service 175

PassTicket
 logon problems 28
performance
 example of search argument 38
 troubleshooting table 31
 worksheet for reporting problems 101
persistent verification
 dump title for RACF subsystem 214
preliminary search for a matching problem 34
problem diagnosis
 making sure this is a RACF problem 2
 procedures for RACF 1
problem reporting procedure for RACF 97
process flow
 IMS use of RACF 189
 RACF callable services 190
 RACF commands 182
 RACF directed commands 183
 RACF installation exits 185
 RACF macros 184
 RACF remove ID utility 187
 RACF report writer 188
 RACF utilities 187
 SMF data unload utility 189
profile
 class identifier 116
 description 116
 description of templates 106
 displayed by BLKUPD, example of 119
 how RACF locates 108, 109
program access to data sets (PADS) 44
program control
 determining programs that need protection 44
program errors for RRSF 139
publications
 on CD-ROM xiv
 softcopy xiv

R

R_admin callable service
 tracing 50
RACDEF macro
 equivalent RACROUTE REQUEST type 149

- RACF
 - classroom courses xiv
 - publications
 - on CD-ROM xiv
 - softcopy xiv
- RACF administration
 - classroom courses xiv
- RACF blocks
 - updating 123
- RACF callable services
 - process flow 190
- RACF commands
 - process flow 182
- RACF Database Managers Request
 - tracing 51
- RACF directed commands
 - process flow 183
- RACF FMIDs 39
- RACF index block errors
 - description 215
- RACF installation exits
 - process flow 185
- RACF macros
 - how to locate parameters in a dump 77
 - ICHEINTY parameter list 179
 - obtaining parameter list for RACROUTE 43, 48
 - process flow 184
- RACF macros and utilities
 - common problems 3
- RACF macros
 - common problems 6
- RACF manager
 - adding a class identifier to profile names 116
- RACF problems
 - data for 41
 - reporting to IBM 97
 - searching for a matching problem 78
- RACF profile
 - description 116
- RACF reason codes
 - in the RACF/DB2 external security module 216
 - obtaining 42
- RACF remove ID utility
 - process flow 187
- RACF report writer
 - process flow 188
- RACF return codes
 - in the RACF/DB2 external security module 216
 - obtaining 42
- RACF security topics
 - classroom courses xiv
- RACF SMF data unload utility
 - process flow 189
- RACF subsystem module
 - dump title for RACF subsystem 213
 - RACF subsystem dumps 213
- RACF utilities
 - common problems 3
 - IRRDBU00 119
 - process flow 187
- RACF/DB2 external security module
 - diagnostic information 216
 - dump titles 216
 - XAPLDIAG output parameter 216
- RACFCNTS symptom in DAEDATA output 218
- RACFRW utility
 - common problems 6
- RACHECK macro
 - equivalent RACROUTE REQUEST type 149
- RACINIT macro
 - equivalent RACROUTE REQUEST type 149
- RACLIST macro
 - equivalent RACROUTE REQUEST type 149
- RACROUTE events
 - obtaining trace records 48
- RACROUTE macro
 - common problems 7
 - parameter list 150
- RACROUTE REQUEST types
 - equivalent RACF system macros 149
- RACROUTE REQUEST=AUTH macro
 - parameter list 154
- RACROUTE REQUEST=DEFINE macro
 - parameter list 158
- RACROUTE REQUEST=EXTRACT macro
 - parameter list 164
- RACROUTE REQUEST=FASTAUTH macro
 - diagnosing failures to grant access 216
 - parameter list 167
- RACROUTE REQUEST=LIST macro
 - parameter list 168
- RACROUTE REQUEST=SIGNON macro 169
 - parameter list 169
- RACROUTE REQUEST=STAT macro 170
 - parameter list 170
- RACROUTE REQUEST=TOKENBLD macro
 - parameter list 170
- RACROUTE REQUEST=TOKENMAP/TOKENXTR
 - macros
 - parameter list 174
- RACROUTE REQUEST=VERIFY macro
 - parameter list 175
- Racroutes
 - tracing 51
- RACSTAT macro
 - equivalent RACROUTE REQUEST type 149
- RACXTRT macro
 - equivalent RACROUTE REQUEST type 149
- RANGE keyword
 - on BLKUPD LIST subcommand 125
- RBA (relative byte address)
 - on READ subcommand of BLKUPD 123
 - used in locating a profile 108, 109
- RBA keyword
 - on CHANGE subcommand of BLKUPD DISPLAY
 - subcommand 129
 - on INSERT subcommand of BLKUPD DISPLAY
 - subcommand 130
- RCVT
 - control block overview 207

- READ subcommand of BLKUPD
 - END subcommand 133
 - FIND subcommand 124
 - for reading a RACF database block 124
 - for updating a RACF database block 124
 - format of 123
 - FORMAT subcommand 126
 - LIST subcommand 125
 - REP subcommand 126
 - REREAD subcommand 133
- reading every profile in your database
 - using the database unload utility (IRRDBU00) 105
- reason codes
 - from callable service 43
 - from RACF macros 42, 43
 - obtaining 42
- recording of errors
 - for callable services 190
 - RRSF 146
- records
 - in the RACF database
 - BAM blocks 107
 - index blocks 108, 109
 - profiles 116
- recovery procedures
 - APPC errors 143
 - failure of MVS system service 142
 - RRSF ESTAE processing 142
 - RRSF failure 141
 - VSAM failures 145
- relative byte address (RBA) 123
- remove ID utility (IRRRID00)
 - common problems 5
 - process flow 187
- REP subcommand of BLKUPD READ
 - subcommand 126
- report writer
 - common problems 6
 - incorrect output 23
 - process flow 188
- reporting problems to IBM
 - abend 98
 - documentation error 98
 - incorrect output 98
 - information to collect 98
 - logon 99
 - loop 100
 - messages 101
 - overview 97
 - performance 101
 - return code 102
 - wait 103
- REREAD subcommand of BLKUPD READ
 - subcommand 133
- RESTART command
 - using to recover from failures 144
- RETAIN symptom string
 - sample in DAEDATA output 218
 - sample in formatted dump 218
- return codes
 - example of search argument 38

- return codes (*continued*)
 - from callable service 43
 - from RACF macros 42
 - obtaining 42, 43
 - troubleshooting table 33
 - worksheet for reporting problems 102
- REVOKE attribute in user profile 28
- RRSF (RACF remote sharing facility)
 - connection states 139
 - connection states after TARGET 141
 - defined state 140
 - dormant by local request state 140
 - dormant by mutual request state 140
 - dormant by remote request state 140
 - dormant in error state 140
 - error recording 146
 - ESTAE processing 142
 - failure recovery 141
 - initial state 140
 - INMSG data set 137, 139
 - introduction 137
 - IRRBW00 utility 146
 - LOGREC data set entries 146
 - not defined state 140
 - operative active state 140
 - operative in error state 140
 - operative pending connection state 139
 - operative pending verification state 140
 - OUTMSG data set 137, 139
 - RRSFLIST data set 146
 - workspace data set 137, 139
 - dumping the data in 146
- RRSFLIST data set
 - recording of errors 146

S

- SAF return codes
 - in the RACF/DB2 external security module 216
- SAF router
 - parameter list 150
- SAF router vector table
 - control block overview 207
- SAFT (security product trace area)
 - fields in 239
- SAFT DSECT 239
- save area
 - use for validating input parameters 77
- SAVE keyword
 - on BLKUPD END subcommand 133
 - on END subcommand of BLKUPD DISPLAY
 - subcommand 132
- SDWA (system diagnostic work area)
 - sample for RACF 219
- search arguments
 - examples 34, 38
- search symptoms
 - for a complete search 78
 - for a preliminary search 34
- security product trace area(SAFT)
 - fields in 239

- security topics for RACF
 - classroom courses xiv
- SEGMENT keyword
 - on BLKUPD DISPLAY subcommand 130
 - on CHANGE subcommand of BLKUPD DISPLAY subcommand 129
- segment table block 106
- sequence set
 - definition of 108, 109
 - format of the chain pointers 115
 - locating an index entry 122
- sequential file
 - creating for further manipulation 105
 - using the database unload utility (IRRDBU00) 105
- shortcut keys 243
- SIGNON request
 - parameter list 169
- SLIP trap
 - setting 41
- SMF data unload utility
 - process flow 189
- SMF records
 - incorrect output 24
- STAT request
 - parameter list 170
- structured search
 - examples of symptoms for RACF 35, 78
- subsystem dumps
 - RACF persistent verification dump title description 214
 - RACF subsystem dump title description 213
- SVC dump title descriptions 208
- symptom record 8, 146, 190
- symptoms
 - for a complete search 78
 - for a preliminary search 34
 - troubleshooting for RACF 8
- SYS1.LOGREC entries
 - for callable services errors 190
 - for RRSF errors 146
- SYS1.MACLIB
 - IRRTEMP1 member 106
- sysplex data sharing option 3, 124
- system dump
 - formatting 42
 - obtaining 41

T

- tape volume
 - how RACF creates and names profiles 116
- task control block (TCB)
 - overview of 208
- tasks
 - performing a preliminary search for a matching problem
 - steps for 34
 - SAF keyring debugging
 - steps for 81
 - SAF Trace debugging
 - steps for 81

- tasks (*continued*)
 - using the troubleshooting tables
 - steps for 7
- TCB (task control block)
 - overview of 208
- templates
 - description of 105, 106
- terminal monitor program
 - executing BLKUPD under 121
- TESTPTR symptom in DAEDATA output 218
- TMP (terminal monitor program)
 - executing BLKUPD under 121
- TOKENBLD request
 - parameter list 170
- TOKENEXTR request
 - parameter list 174
- TOKENMAP request
 - parameter list 174
- trace area
 - SAFT 239
- traces
 - for callable services 51
 - for R_admin callable service 50
 - for RACF Database Managers Requests 51
 - for racroutes 51
 - obtaining 43
 - obtaining command trace records 49
 - obtaining for program access to data sets 44
 - obtaining for program control 44
 - obtaining on z/OS UNIX System Services 48
 - obtaining using SET TRACE command 48
- transmission and line errors 139
- troubleshooting problems
 - overview 1
 - RACF database 105
- troubleshooting table
 - abends incorrectly issued 22
 - access with no message issued 20
 - DSMON report 23
 - loop 29
 - macro return code or reason code 27
 - messages 21, 29
 - overview 7
 - performance 31
 - RACF database 25
 - RACF LIST command output 23
 - reason code from macro or utility 27
 - report writer report 23
 - return code from macro or utility 27
 - SMF records 24
 - utility return code or reason code 27

U

- unloading to a sequential file 119
- UPDATE keyword
 - on READ subcommand of BLKUPD 124
- utilities
 - incorrect output 27
 - IRRBRW00 146
 - IRRDBU00 119

utilities (*continued*)
 process flow 187
 VSAM file browser 146

V

variable data collected by RACF callable services
 descriptions 191
VER keyword
 on BLKUPD REPLACE subcommand 127
VERIFY request
 parameter list 175
VERIFYX request
 parameter list 175
VRA (variable recording area) keys
 provided by RACF 217
VSAM data sets
 IRRBRW00 utility 146
VSAM errors
 messages issued 145
VSAM failures 145
 automatic direction 145
 password synchronization 146

W

waits
 example of search argument 38
 troubleshooting table 34
 worksheet for reporting problems 103
workspace data sets, dumping the data in 146

X

X'0C' delimiter 116
XAPLDIAG parameter 216

Z

z/OS UNIX System Services
 RACF callable services process flow 190

Readers' Comments — We'd Like to Hear from You

z/OS
Security Server RACF Diagnosis Guide

Publication No. GA22-7689-03

Overall, how satisfied are you with the information in this book?

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Overall satisfaction	<input type="checkbox"/>				

How satisfied are you that the information in this book is:

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Accurate	<input type="checkbox"/>				
Complete	<input type="checkbox"/>				
Easy to find	<input type="checkbox"/>				
Easy to understand	<input type="checkbox"/>				
Well organized	<input type="checkbox"/>				
Applicable to your tasks	<input type="checkbox"/>				

Please tell us how we can improve this book:

Thank you for your responses. May we contact you? Yes No

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

Name

Address

Company or Organization

Phone No.



Fold and Tape

Please do not staple

Fold and Tape



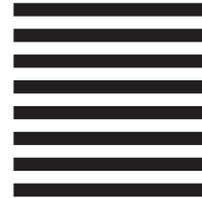
NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

IBM Corporation
Department 55JA, Mail Station P384
2455 South Road
Poughkeepsie, NY
12601-5400



Fold and Tape

Please do not staple

Fold and Tape



Program Number: 5694-A01, 5655-G52

Printed in U.S.A.

GA22-7689-03

