

Transaction Processing Facility



Migration Guide: TPF 3.1 System to TPF 4.1 System

Version 4 Release 1

Transaction Processing Facility



Migration Guide: TPF 3.1 System to TPF 4.1 System

Version 4 Release 1

Note!

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

Second Edition (December 2000)

This is a major revision of, and obsoletes, GH31-0186-00 and all associated technical newsletters.

This edition applies to Version 4 Release 1 Modification Level 0 of IBM Transaction Processing Facility, program number 5748-T14, and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters. Make sure you are using the correct edition for the level of the product.

IBM welcomes your comments. Address your comments to:

IBM Corporation
TPF Systems Information Development
Mail Station P923
2455 South Road
Poughkeepsie, NY 12601-5400
USA

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 1999, 2000. All rights reserved.**

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

Contents

Figures	ix
Tables	xi
Notices	xiii
Trademarks	xiii
About This Book	xv
Before You Begin	xv
Who Should Read This Book	xvi
How This Book is Organized	xvi
Conventions Used in the TPF Library	xvi
Related Information	xvii
IBM Transaction Processing Facility (TPF) 4.1 Books	xvii
IBM High-Level Language Books	xvii
Miscellaneous IBM Books	xvii
Online Information	xviii
How to Send Your Comments	xviii
Guidelines for Using This Publication	1
Who Should Use This Publication	1
How This Publication Is Organized	1
Planning for TPF System Migration	3
Checklist for Planning Your System Migration	3
Learning about What Is in the TPF 4.1 System	7
Features of the TPF 4.1 System	7
Areas with Changes or New Functions in the TPF 4.1 System	8
Summarizing the New, Changed, and Obsolete Interfaces	23
How to Read the Tables	23
SIP Macros and Statements	24
SIP Skeletons and Internal Macros (Inner Macros)	25
SIP Stage II Macros	27
System Communication Keypoint (SCK) Generation Macros	28
General and System Macros	28
General Macros	28
System Macros	30
Information-Only Macros	34
Structured Programming Macros (SPMs)	35
Structured Programming Macros (SPMs) (IBM Use Only)	35
Selected Equate Macros	35
Advanced Program-to-Program Communications (APPC) Macros	36
Systems Network Architecture (SNA) Communication Macros and Statements	37
Program Test Vehicle (PTV) Macros	37
New, Changed, and Obsolete Data Macros	37
New, Changed, and Obsolete General Use C Language Support Functions	46
New, Changed, and Obsolete General Use C Language Header Files	49
New, Changed, and Obsolete User Exits	51
Control Program (CP) User Exits	51
ECB User Exits	53
New, Changed, and Obsolete Control Program Interface (CINFC) Tags	56

New, Changed, and Obsolete Configuration Constant (CONKC) Tags	59
New, Changed, and Obsolete System Equates (SYSEQ)	59
SYSEQ Tags	60
New, Changed, and Obsolete Commands	62
New, Changed, and Obsolete System Errors and Messages	84
New, Changed, and Obsolete Areas of the TPF 4.1 System	158
Fixed File Records	158
Segments	158
Control Programs (CPs)	183
Control Program (CP) Copy Members	183
Operating Environment Requirements and Planning Information	185
Hardware	185
Servers	185
Storage Devices	186
Unit Record Devices	187
Interconnection Devices	187
Control Units	188
Terminals and Display Devices	189
Consoles	189
Central Processing Complexes (CPCs)	189
Single Central Processing Complex (CPC) Environment	191
Loosely Coupled Complex	193
High Performance Option (HPO) Feature	196
Software (Programming Requirements)	196
OS/390 or MVS Requirements	196
C and C++ Compiler Requirements	196
SNA-Based Communication Requirements	197
TCP/IP-Based Communication Requirements	198
Non-SNA-Based Communication Requirements	199
Miscellaneous Requirements	199
TPF 4.1 Product Information Requirements	199
PDF and HTML Format	200
Requests for Price Quotations (RPQs) and Programming Requests for Price Quotations (PRPQs) by Protocol	200
IBM Extended Operations Console Facility/2 (EOCF/2) and IBM Transaction Processing Facility Database Facility (TPPDF)	201
Interprocessor Communications for the High Performance Option User	202
Migrating from DASD IPC to MPIF IPC	202
Generating the TPF 4.1 System	203
File Address Compute Program (FACE) Table Generation and System Initialization Program	204
System Installation Program (SIP) Changes	204
Defining the Database	204
Defining Record Types for Capture and Restore	206
Defining Record Types for Multiple TPF Images	206
Defining Record Types for the E-Type Loader	206
Defining Record Types for Program Version Information	207
Defining the New Record ID for the TPF Application Requester (TPFAR) Feature	208
Generating the File Address Compute Program (FACE) Table	208
Allocating Globals	209
ACF/SNA Table Generation Support	210
Setting Bit Strings for System Generation Option Bytes	211
Formatting the General File Loader (ALDR)	212

Reformatting Online Modules	212
Working Storage and 16-MB Constraint Relief	212
Transaction Protection and Data Integrity	213
Increased Main Storage for Application Use	213
Allocating Working Storage	214
Modifying Pilot Tapes for Globals	215
Setting Central Processing Unit (CPU) Loop Shutdown Levels	216
Setting Communications Shutdown Levels	216
Program Allocation Process	216
Allocating Programs, Transfer Vectors, and Pools	217
Adding Your Own Authorization Bits	223
Adding Your Own Function Switches	223
System Allocator (SALO) Program	223
Running the System Allocator (SALO)	224
Locking Programs into Main Storage	225
Excluding a List of Literals (LTORGs) to Save Space	225
E-Type Loader	225
Systems Network Architecture (SNA) Communication	226
Defining the Control Program (CP)	226
Linkage Editing (LEDT)	227
Patching	228
Modifying Low Core	228
Receiving Messages from the Online General File Loader (ACPL)	228
Customizing the Code	229
The TPF 4.1 Control Program Environment	230
Control Program User Exits	230
Changes to Input/Output (I/O) Coding	230
Changing the System State	231
Macro Decoder and SVCs	231
Defining SVCs	231
To Add New (Or Existing) SVCs to the TPF 4.1 System	231
Defining User CINFC Labels	232
The Monitor Call (MC) Facility	232
Modifying Low Storage	233
Changed Macros	233
Getting and Releasing System Workblocks (SWBs)	233
Internal Event Facility	233
Data Collection Changes	233
Critical Record Filing	234
Macro Trace	234
Changes to the Real-Time Trace (RTT) Facility	234
Changes to the Selective File Dump and Trace (SFDT) Facility	234
Subtracting the X'18' Displacement	235
Changes to Inter-I-Stream Communication	235
Activating E-Type Programs	235
Testing System Generation (SYSTC) Bits	235
Requesting MPIF Service	235
Changing the Fault-Rate Threshold	235
Moving Data Between Address Spaces	236
Modifying the TPF System Error Package	236
Controlling Dump Content	237
To Control the Content of Your SERRC Dump	237
Defining Keywords	237
Coding Dump Overrides	237
Coding Prefixes	238

Understanding Database Administration	241
Expanded File Addressing Capacity and File Address Reference Format	241
Migrating File Addresses	242
Migrating from FARF3 to FARF4	245
Migrating from FARF4 to FARF5	246
Making Sure All FARFx Records Are Removed	246
Accessing the File Address Compute Program (FACE) Table	247
Accessing Processor, SSU, and I-Stream Unique Records	247
Migration Considerations for Pools	247
Migrating Pool File Addresses	248
Program Size and Segmentation	248
Virtual File Access (VFA)	248
Tuning Virtual File Access (VFA)	249
Allocating Working Storage and Virtual File Access (VFA) Storage	249
 Understanding Systems Network Architecture (SNA) Communication	251
Systems Network Architecture (SNA) Communication	251
Defining Systems Network Architecture (SNA) Resources	252
Generating the Systems Network Architecture (SNA) Table	252
Consolidating TPF/APPC Application Program Names Across CTC	253
Modifying Systems Network Architecture (SNA) Network Definitions	254
Converting Network Node Names	254
TPF Advanced Program-to-Program Communications (TPF/APPC)	254
Changes for 3-Byte Resource Identifiers (RIDs)	255
Changes for the SNA Communication Trace Facilities	256
 Understanding Non-SNA Communication	257
Non-SNA Communication	257
Setting Non-SNA Communication Shutdown Levels	258
Using Synchronous Link Control (SLC)	258
Using Binary Synchronous Communication (BSC)	258
Using 3270 Local Support	259
Referencing the CCWP and BVT Tables	259
Changes to Channel Control Word (CCW) Areas	260
 Understanding Operations	261
Multiple-Volume Tape Dumps and Post Processing	261
Example 1	261
Example 2	261
Modifying System Generation Option Values	262
Modifying Storage Allocation Values Online	262
Specifying and Overriding System Error Options	263
Options that Changed for the ZASER Command	263
System Error Support	264
Modifying Dump Tags	265
Multiple TPF Images	265
Modifying and Displaying Multiple TPF Images	266
Modifying and Displaying the Program Allocation Table	268
Assigning Data Definition Names to Input Devices	268
Loading E-Type Programs	268
Loading and Activating New Versions of Programs	270
Falling Back to Previous Versions of Programs	270
Accepting New Versions of Programs	270
Reissuing ZOLDR Commands Should the TPF System Malfunction	271
Modifying and Displaying Records, Data, Main Storage, and Programs	271
Maintaining Memory Patch Decks	271

Modifying and Displaying CPU Loop and Create Macro Control Levels	272
Adding, Modifying, and Displaying Commands	272
Turning System Trace Options On and Off	272
Activating and Deactivating the PIU Trace Facility	272
Using the Program Event Recording (PER) Trace Facility	272
Handling Channel and Machine Checks	273
Thresholds	273
Service Processor (SVP) Damage, Warning, and Degradation	273
System Recovery Messages	274
Recovering from Disabled Wait State Codes	274
Operational Changes to IPLB	274
Duplicate Volume Serial Numbers (VSNs)	274
Destructive Initial Program Load (IPL)	274
Modifications to Database Reorganization (DBR) Commands	275
Learning About the Changes in System Support Services	277
System Support	277
Real-Time Tape Post Processing	279
Load Balancing for Capture and Restore	279
Running Capture	279
Tape Support	280
Automatic Tape Mounting and Capture and Restore	281
Restoring Components of TPF Images	281
Online File Recoup	282
Enhancements to Online File Recoup (APAR PJ21224)	282
Returning from Recoup GROUP Macro Exit Code	283
Database Reorganization (DBR)	283
Running Database Reorganization (DBR)	283
Capturing Fixed Record Types	284
Eligibility for Database Reorganization (DBR) Input	284
Data Collection and Reduction, and Performance Monitoring	284
Data Collection	286
Data Reduction	286
Diagnosing Problems and Debugging	293
D diagnostic Tools	293
Virtual-Equals-Real (VEQR) Operating Mode	296
Testing the Migration (Virtual-Equals-Real (VEQR) Mode)	296
How Virtual-Equals-Real (VEQR) Mode Works	297
Starting and Stopping Virtual-Equals-Real (VEQR) Mode	298
System Log Trace Facility	298
Block Checking Mode	299
To Turn On Block Checking Mode	300
To Turn Off Block Checking Mode	300
Program Test Vehicle (PTV) Changes	300
Using the Program Event Recording (PER) Trace Facility	300
Running Virtual Machine (VM) Program Event Recording	301
Running Program Event Recording (PER) in a Native TPF 4.1 System	301
Path Information Unit (PIU) Trace Facility	301
PIUPRT Utility	302
Systems Network Architecture (SNA) I/O Trace Facility	303
Changing Application Programs for Migration	305
Changes to E-Type Programs	305
Getting and Releasing Working Storage	307
Getting and Releasing Heap Storage	307

Sharing Data between ECBs	308
Moving Data Between Address Spaces	309
Storage Manipulation Macros No Longer Supported	309
Validating Block Addresses (VALBC)	310
Issuing Macros that Require Authorization	310
Changes to Application Utilities	311
Changes to I-Stream Unique Globals	311
Testing Global Attribute Indicators	311
Block Scanning or ECB Checking	312
Using Input/Output Blocks (IOBs).	312
Monitoring System Activity	312
Shutdown Levels.	312
Querying the Number of Storage Blocks	312
Modifying Your Application Programs	312
Migration Considerations for Application Programs	313
Macro Considerations	313
Reentrancy Considerations	313
Program Nesting Levels	313
Data Sharing Considerations	314
31-Bit Addressing Considerations.	314
File Address Reference Formats (FARF) Considerations	314
Miscellaneous Considerations	314
Learning about the TPF 4.1 Library	315
Appendix. Migrating System Error Calls (SERRC)	319
System Error Calls (SERRC) Migration Considerations.	319
List of Areas	319
Index	323

Figures

1. Allocating #OLDx Records	207
2. Calculation for Allocating #OLDx Records	207
3. RIAT Definition for #OLDx Record Types	207
4. RIAT Definition for #PVRx Record Types	208
5. Location of Global Areas in a Multiprocessing Environment with Three I-Streams.	210
6. Virtual Storage Layout	215
7. Components of Dump Content Control	239
8. File Address Reference Format 3 (FARF3)	242
9. File Address Reference Format 4 (FARF4)	244
10. File Address Reference Format 5 (FARF5)	244
11. Virtual-Equals-Real (VEQR) Addressing Example	298

Tables

1. Areas with Changes or New Functions in the TPF 4.1 System	8
2. How to Read the Tables	23
3. Changes to SIP Stage I Macros and Statements for the TPF 4.1 System	24
4. Changes to SIP Skeleton and Internal Macros for the TPF 4.1 System	25
5. Changes to SIP Stage II Macros for the TPF 4.1 System	27
6. Changes to System Communication Keypoint (SCK) Macros for TPF 4.1 System	28
7. Changes to General Macros for the TPF 4.1 System	28
8. Changes to System Macros for the TPF 4.1 System	31
9. Changes to Information-Only Macros for the TPF 4.1 System	34
10. Changes to Structured Programming Macros (SPMs) for the TPF 4.1 System	35
11. Changes to Structured Programming Macros (SPMs) (IBM Use Only) for the TPF 4.1 System	35
12. Changes to Selected Equate Macros for the TPF 4.1 System	35
13. Changes to Advanced Program-to-Program Communications (APPC) Macros for the TPF 4.1 System	36
14. Changes to SNA Communication Macros for the TPF 4.1 System	37
15. Changes to Program Test Vehicle (PTV) Macros for the TPF 4.1 System	37
16. Changes to Data Macros for the TPF 4.1 System	37
17. Changes to General Use C Language Support Functions for the TPF 4.1 System	46
18. Changes to General Use C Language Header Files for the TPF 4.1 System	49
19. Changes to Control Program (CP) User Exits for the TPF 4.1 System	51
20. Changes to ECB User Exits for the TPF 4.1 System	53
21. Changes to CINFC Tags for the TPF 4.1 System	56
22. Changes to CONKC Tags for the TPF 4.1 System	59
23. Changes to SYSEQ Tags for the TPF 4.1 System	60
24. Changes to Commands for the TPF 4.1 System	63
25. Changes to Messages and System Errors in the TPF 4.1 System	85
26. Changes to Fixed File Records	158
27. Changes to Segments	158
28. Changes to Control Programs (CPs)	183
29. Changes to Control Program (CP) Copy Members	183
30. Communication Controllers Supported by the TPF 4.1 System	188
31. Central Processing Complexes (CPCs) and Loosely Coupled Support	189
32. Requests for Price Quotations (RPQs) and Product Features for Central Processing Complexes (CPCs)	190
33. New Installation RPQs or Functions	192
34. New Installation RPQs	194
35. C and C++ Compilers Supported by PUT	196
36. 3705 EP/VS RPQs, by Protocol, Supported by the TPF 4.1 System	200
37. 3720 ACF/NCP RPQs, by Protocol, Supported by the TPF 4.1 System	200
38. 3725 ACF/NCP/VS RPQs, by Protocol, Supported by the TPF 4.1 System	200
39. 3745 ACF/NCP RPQs, by Protocol, Supported by the TPF 4.1 System	201
40. Programming Request for Price Quotation (PRPQ) for TCP/IP Support	201
41. Summary of CLASS Values for File Resident Programs	219
42. Changes to the System Error Options for the ZASER Command	263
43. Changes to the Snapshot Dump Options for the ZASER Command	264
44. Loading and Activating New Versions of Programs	270
45. Falling Back to Previous Versions of Programs	270
46. Accepting New Versions of Programs	270
47. Reissuing ZOLDR Commands Should The TPF System Malfunction	271
48. General Reduction Report Changes	288
49. System Reduction Report Changes	288
50. File Reduction Report Changes	289
51. Program Reduction Report Changes	290

52.	Message Reduction Report Changes	291
53.	System Log Trace Summary	299
54.	Assembler Macros and IBM C Language Functions to Manage Heap Storage	307
55.	Storage Manipulation Macros No Longer Supported for the TPF 4.1 System	309
56.	Summary of Changes Made in the TPF 4.1 Library.	315

Notices

References in this book to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service in this book is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any of IBM's intellectual property rights may be used instead of the IBM product, program, or service. Evaluation and verification of operation in conjunction with other products, except those expressly designated by IBM, is the user's responsibility.

IBM may have patents or pending patent applications covering subject matter 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

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 and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
Department 830A
Mail Drop P131
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.

Any pointers in this book to non-IBM Web sites are provided for convenience only and do not in any way serve as an endorsement. IBM accepts no responsibility for the content or use of non-IBM Web sites specifically mentioned in this book or accessed through an IBM Web site that is mentioned in this book.

Trademarks

The following terms are trademarks of the IBM Corporation in the United States or other countries or both:

ACF/VTAM
AD/Cycle
Advanced Peer-to-Peer Networking
AIX
APPN
AS/400
BookManager
BookMaster
CICS
C/MVS
C++/MVS

C/370
DATABASE 2
DB2
DFSMS/MVS
Distributed Relational Database Architecture
DRDA
Enterprise Systems Architecture/370
Enterprise Systems Architecture/390
Enterprise Systems Connection Architecture
EOCF/2
ES/3090
ES/9000
ESCON
IBM
Library Reader
MQSeries
Multiprise
MVS/ESA
MVS/SP
MVS/XA
OpenEdition
Operating System/2
OS/2
OS/390
PR/SM
Processor Resource/Systems Manager
RISC System/6000
Sysplex Timer
System/370
System/390
TeamConnection
VM/ESA
VisualAge
VTAM
XT
3090.

ActionMedia, LANDesk, MMX, Pentium and ProShare are trademarks or registered trademarks of Intel Corporation in the U.S and other countries. For a complete list of Intel trademarks, see:

<http://www.intel.com/sites/corporate/tradmarx.htm>

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation 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.

About This Book

This book is written for any IBM Transaction Processing Facility (TPF) customer who is migrating, or planning to migrate, from the IBM Transaction Processing Facility Version 3 Release 1 system (referred to as the TPF 3.1 system in the remainder of this book) to the IBM Transaction Processing Facility Version 4 Release 1 system (referred to as the TPF 4.1 system in the remainder of this book).

Note: This book should be used as a planning guide and is subject to change.

This book describes changes between the TPF 3.1 system and the TPF 4.1 system, and provides general information to help you plan for your TPF system migration. It does not contain specific information about planning for your migration and it does not contain information about installing the TPF 4.1 system. See the *TPF System Installation Support Reference* and *TPF System Generation* for more information about installation and system generation.

Some changes do not require any action on your part. For example, if you currently use the TPF 3.1 system without modifications and plan to use the TPF 4.1 system without making any modifications, it may not be necessary for you to make any changes. However, if you did make modifications to the TPF 3.1 system and plan to make modifications to the TPF 4.1 system, or you want to take advantage of the new functions provided in the TPF 4.1 system, then it will be necessary for you to make changes.

In addition, other changes found in the TPF 4.1 system may require you to make changes to the following to ensure the continued availability of existing functions:

- Any user-defined modifications
- Operating procedures
- Application programs.

Although all of these changes are discussed in this book, required changes are the primary focus.

In this book, abbreviations are often used instead of spelled-out terms. Every term is spelled out at first mention followed by the all-caps abbreviation enclosed in parentheses; for example, Systems Network Architecture (SNA). Abbreviations are defined again at various intervals throughout the book. In addition, the majority of abbreviations and their definitions are listed in the master glossary in the *TPF Library Guide*.

Before You Begin

Before you begin using this book, make the following determination:

- If you are migrating, or planning to migrate, from the TPF 3.1 system to the TPF 4.1 system, go “Guidelines for Using This Publication” on page 1 for information about how to use this book.
- If you are applying changes and updates to an **existing** TPF 4.1 system, see the *TPF Migration Guide: Program Update Tapes*.

See “Communicating Your Comments to IBM” for more information about how to contact your TPF support representative.

Who Should Read This Book

This book is designed for anyone responsible for:

- Planning the migration from a TPF 3.1 system to a TPF 4.1 system such as system programmers, operators, and application programmers
- Installing, initializing, operating, customizing, tuning, or diagnosing problems in the TPF 4.1 system.

Readers of this book should have an in-depth knowledge of the TPF system as well as the configuration and procedures of their own complex.

How This Book is Organized

This book is organized by chapter, and includes an appendix and index.

Conventions Used in the TPF Library

The TPF library uses the following conventions:

Conventions	Examples of Usage
<i>italic</i>	Used for important words and phrases. For example: <i>A database</i> is a collection of data. Used to represent variable information. For example: Enter ZFRST STATUS MODULE <i>mod</i> , where <i>mod</i> is the module for which you want status.
bold	Used to represent text that you type. For example: Enter ZNALS HELP to obtain help information for the ZNALS command. Used to represent variable information in C language. For example: level
monospaced	Used for messages and information that displays on a screen. For example: PROCESSING COMPLETED Used for C language functions. For example: maskc Used for examples. For example: maskc(MASKC_ENABLE, MASKC_IO);
<i>bold italic</i>	Used for emphasis. For example: You <i>must</i> type this command exactly as shown.
<u>Bold underscore</u>	Used to indicate the default in a list of options. For example: Keyword=OPTION1 <u>DEFAULT</u>
Vertical bar	Used to separate options in a list. (Also referred to as the OR symbol.) For example: Keyword=Option1 Option2 Note: Sometimes the vertical bar is used as a <i>pipe</i> (which allows you to pass the output of one process as input to another process). The library information will clearly explain whenever the vertical bar is used for this reason.
CAPital LETters	Used to indicate valid abbreviations for keywords. For example: KEYWord= <i>option</i>

Conventions	Examples of Usage
Scale	<p>Used to indicate the column location of input. The scale begins at column position 1. The plus sign (+) represents increments of 5 and the numerals represent increments of 10 on the scale. The first plus sign (+) represents column position 5; numeral 1 shows column position 10; numeral 2 shows column position 20 and so on. The following example shows the required text and column position for the image clear card.</p> <pre> ...+....1....+....2....+....3....+....4....+....5....+....6....+....7...</pre> <p>LOADER IMAGE CLEAR</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. The word LOADER must begin in column 1. 2. The word IMAGE must begin in column 10. 3. The word CLEAR must begin in column 16.

Related Information

A list of related information follows. For information on how to order or access any of this information, call your IBM representative.

IBM Transaction Processing Facility (TPF) 4.1 Books

- *TPF ACF/SNA Data Communications Reference*, SH31-0168
- *TPF Application Programming*, SH31-0132
- *TPF C/C++ Language Support User's Guide*, SH31-0121
- *TPF Concepts and Structures*, GH31-0139
- *TPFDF and TPF Structured Programming Macros*, SH31-0183
- *TPF General Information*, GH31-0147
- *TPF General Macros*, SH31-0152
- *TPF Migration Guide: Program Update Tapes*, GH31-0187
- *TPF Operations*, SH31-0162
- *TPF System Installation Support Reference*, SH31-0149
- *TPF System Generation*, SH31-0171
- *TPF System Macros*, SH31-0151
- *TPF System Performance and Measurement Reference*, SH31-0170
- *TPF Transmission Control Protocol/Internet Protocol*, SH31-0120.

IBM High-Level Language Books

- *IBM C/C++ for MVS/ESA C++/MVS Language Reference*, SC09-1992
- *OS/390 C/C++ Run-Time Library Reference*, SC28-1663
- *OS/390 C/C++ User's Guide*, SC09-2361
- *SAA Common Programming Interface C Reference - Level 2*, SC09-1308.

Miscellaneous IBM Books

- *IBM 3590 Hardware Library* (order the correct books, version and release for your installation)
- *MQSeries Application Programming Reference*, SC33-1673
- *MQSeries Clients*, GC33-1632
- *MQSeries Distributed Queue Management Guide*, SC33-1139

- *MQSeries Message Queue Interface Technical Reference*, SC33-0850
- *NCP/SSP/EP Resource Definition Reference* (order the correct version and release for your installation)
- *S/390 Processor Resource/Systems Manager Planning Guide*, GA22-7236
- *TCP/IP for MVS: Offloading TCP/IP Processing, Version 3, Release 1*, SC31-7133
- *VTAM Network Implementation Guide* (order the correct version and release for your installation)
- *VTAM Operation*, SC31-6495
- *VTAM Resource Definition Reference* (order the correct version and release for your installation)
- *3990 Transaction Processing Facility Support RPQs*, GA32-0134.

Online Information

- *IBM Online Library Omnibus Edition: MVS Collection*, SK2T-0710
- *IBM Online Library Omnibus Edition: OS/390 Collection*, SK2T-6700
- *IBM Online Library: Transaction Processing and Data Collection Kit*, SK2T-0730
- *Messages (Online)*
- *Messages (System Error and Offline)*.

How to Send Your Comments

Your feedback is important in helping to provide the most accurate and highest quality information. If you have any comments about this book or any other TPF information, use one of the methods that follow. Make sure you include the title and number of the book, the version of your product and, if applicable, the specific location of the text you are commenting on (for example, a page number or table number).

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.

- If you prefer to send your comments electronically, do either of the following:
 - Go to <http://www.ibm.com/tpf/pubs/tpfpubs.htm>.
There you will find a link to a feedback page where you can enter and submit comments.
 - Send your comments by e-mail to tpfid@us.ibm.com
- If you prefer to send your comments by mail, address your comments to:

IBM Corporation
 TPF Systems Information Development
 Mail Station P923
 2455 South Road
 Poughkeepsie, NY 12601-5400
 USA
- If you prefer to send your comments by FAX, use this number:
 - United States and Canada: 1 + 845 + 432 + 9788
 - Other countries: (international code) + 845 + 432 +9788

Guidelines for Using This Publication

This chapter provides information about the organization of this publication and how to use it efficiently.

Who Should Use This Publication

This publication is written for any IBM Transaction Processing Facility (TPF) customer who is migrating, or planning to migrate, from the IBM Transaction Processing Facility Version 3 Release 1 system (referred to as the TPF 3.1 system in the remainder of this publication) to the IBM Transaction Processing Facility Version 4 Release 1 (referred to as the TPF 4.1 system in the remainder of this publication).

This publication describes changes between the TPF 3.1 system and the TPF 4.1 system, and provides general information to help you plan for your TPF system migration. It does not contain specific information about planning for your migration and it does not contain information about installing the TPF 4.1 system. See the *TPF System Installation Support Reference* and *TPF System Generation* for more information about installation and system generation.

Some changes do not require any action on your part. For example, if you currently use the TPF 3.1 system without modifications and plan to use the TPF 4.1 system without making any modifications, it may not be necessary for you to make any changes. However, if you did make modifications to the TPF 3.1 system and plan to make modifications to the TPF 4.1 system, or you want to take advantage of the new functions provided in the TPF 4.1 system, then it will be necessary for you to make changes.

In addition, other changes found in the TPF 4.1 system may require you to make changes to the following to ensure the continued availability of existing functions:

- Any user-defined modifications
- Operating procedures
- Application programs.

Although all of these changes are discussed in this publication, required changes are the primary focus.

How This Publication Is Organized

This publication is organized in chapter format. Each chapter is dedicated to a specific task you must consider during the TPF 3.1 system to TPF 4.1 system migration, and :

- Describes changes between the TPF 3.1 system and the TPF 4.1 system
- Provides general information to help you plan for your TPF system migration.

This publication does not contain specific information about planning for your migration and it does not contain information about installing the TPF 4.1 system. See the *TPF System Installation Support Reference* and *TPF System Generation* for more information about installation and system generation.

Some changes do not require any action on your part. For example, if you currently use the TPF 3.1 system without modifications and plan to use the TPF 4.1 system

without making any modifications, it may not be necessary for you to make any changes. However, if you did make modifications to the TPF 3.1 system and plan to make modifications to the TPF 4.1 system, or you want to take advantage of the new functions provided in the TPF 4.1 system, it will then be necessary for you to make changes.

In addition, other changes found in the TPF 4.1 system may require you to make changes to the following to ensure the continued availability of existing functions:

- Any user-defined modifications
- Operating procedures
- Application programs.

Although all these changes are discussed in this publication, required changes are the primary focus. To begin, turn to “Planning for TPF System Migration” on page 3.

Planning for TPF System Migration

This chapter provides a checklist to help you plan your system migration from a TPF 3.1 system to a TPF 4.1 system.

You might want to plan for the migration by installing and stabilizing the TPF 4.1 system without incorporating the new functions provided. Installing a new release without initially exploiting functions allows you to create a stable TPF environment.

Checklist for Planning Your System Migration

The items in this checklist are intended to be used in sequential order for a typical TPF system. Refer to this checklist while planning your migration from the TPF 3.1 system to the TPF 4.1 system, and developing your migration plan. Place a check mark (✓) beside each item as you complete it.

Your migration plan can address the following topics:

1. Planning for the migration project:

- Review notes from previous migration plans and identify the need for a new migration plan.
- Obtain commitment and dedication to the migration plan.
- Identify resources, including a project leader.
- Identify the implementation tasks.
- Document your existing environment (list hardware and software tools that you now have and identify those that are not supported in the TPF 4.1 system.). See “Operating Environment Requirements and Planning Information” on page 185 for more information.
- Identify the prerequisite hardware, software, and tools (IBM and non-IBM) for the TPF 4.1 system. See “Operating Environment Requirements and Planning Information” on page 185 for more information.
- Identify the network prerequisites. See “Operating Environment Requirements and Planning Information” on page 185 for more information.
- Identify the hardware, programming, and data set requirements needed to perform the migration tasks. See “Operating Environment Requirements and Planning Information” on page 185 for more information.
- Identify new IBM Multiple Virtual Storage (MVS) data sets or changes required to existing MVS data sets.
- Identify new TPF records, changes required to existing TPF records, and TPF records that are no longer supported.
- Identify naming conventions for loadsets. For more information about loadsets, see “E-Type Loader” on page 225.
- Identify which, if any, migration aids are available.
- Access the scope of the migration plan and the resources required.
- Access the impact of the migration plan and risks (including the impact on application programs and performance).
- Address main storage considerations. See “Operating Environment Requirements and Planning Information” on page 185 for more information.
- Identify the need for a fallback plan.
- Identify training and education requirements.

2. Training:

- Application programmers
 - Coverage programmers
 - Operators
 - Planning personnel
 - System programmers
 - System support personnel.
3. Preparing the migration plan:
 - Review the summary of new, changed, or obsolete functions, messages, macros, and so on. See “Summarizing the New, Changed, and Obsolete Interfaces” on page 23 for more information.
 - Review the summary of program temporary fixes (PTFs) and cross dependencies required for the TPF 4.1 system.
 - Determine hardware changes (supported and not supported).
 - Evaluate the changes in the operating system.
 - Evaluate the network considerations.
 - Estimate the capacity impact of the TPF 4.1 system (central processing unit (CPU) utilization for a message, storage requirements, DASD input/output (I/O) access, network controller, and link requirements).
 - Develop and document a migration plan.
 - Develop a process for problem management; specifically, for migrating and testing the TPF 4.1 system.
 - Develop a test plan.
 - Develop a fallback plan.
 - Identify the migration tasks that you can do to the TPF 3.1 system before receiving the TPF 4.1 system.
 - Determine and develop training and education.
 4. Allocating the libraries (the TPF and the IBM Multiple Virtual Storage (IBM MVS) data sets).
 5. Installing and starting the TPF 4.1 system:
 - Define the I/O configuration.
 - Generate the new TPF 4.1 system. See “Generating the TPF 4.1 System” on page 203 for more information.
 - System generation changes, changes to the system initialization program (SIP) macros and inputs of SIP (for non-SIP customers).
 - Initialize system parameters.
 6. Evaluating customized code (user modifications):
 - Evaluate existing user modifications against the TPF 4.1 system to determine whether any of the modifications do not need to be carried forward; and if the modifications do need to be carried forward, be sure to review that code. See “Customizing the Code” on page 229 for more information.
 - Evaluate new and changed user exits and ways to change the TPF 4.1 system. Determine whether programs using these exits need to be changed. See “Customizing the Code” on page 229 for more information.
 - Review user exits, for example, determine whether there are user exit alternatives to user modifications
 - Evaluate changes to macros and control blocks that can affect user-written code. See “Customizing the Code” on page 229 for more information.

- Evaluate changes in the interfaces. See “Summarizing the New, Changed, and Obsolete Interfaces” on page 23 and See “Customizing the Code” on page 229 for more information.
 - Evaluate new and updated programming functions that are available to programmers. See “Customizing the Code” on page 229 for more information.
7. Migrating the network:
 - Evaluate the network definition. See “Understanding Systems Network Architecture (SNA) Communication” on page 251 and “Understanding Non-SNA Communication” on page 257 for more information.
 8. Migrating the operating system:
 - Evaluate new and changed commands, messages, and operational procedures for both programmers and operators. See “Summarizing the New, Changed, and Obsolete Interfaces” on page 23 and See “Understanding Operations” on page 261 for more information.
 - Evaluate any operating system changes that can affect user (operating system) modifications.
 9. Diagnosing and debugging:
 - Review the new and changed dump formats, trace facilities, and debugging considerations. See “Diagnosing Problems and Debugging” on page 293 for more information.
 - Review the new and changed ways to record program errors and using new tools. See “Diagnosing Problems and Debugging” on page 293 for more information.
 10. Migrating the application programs:
 - Determine which modifications (for example, macros, interfaces, user exits, C functions, and so on) are required to existing application programs. See “Summarizing the New, Changed, and Obsolete Interfaces” on page 23 and “Changing Application Programs for Migration” on page 305 for more information.
 11. Testing Considerations:
 - Test high-exposure operations.
 - Test tools (IBM and non-IBM).
 - Test the IBM Virtual Telecommunications Access Method (VTAM) test prerequisites.
 - Test application programs.
 - Test using teleprocessing network simulator (TPNS).
 - Test offline.
 - Test operations, including any automation packages that you may have installed. Use the online operations staff to test before the migration.
 - Test the utilities (Capture and Restore, Recoup, Online Load, Data Collection, and so on).
 - Conduct a system test.
 - Conduct a regression test.
 - Test communications.
 - Test the inter-node communications.
 - Test the network.
 - Test any user modifications.
 - Determine the impact of testing ongoing migration plans.

- Determine the potential impact on the IBM Virtual Machine/Enterprise Systems Architecture (VM/ESA) system.
- 12. Taking pre-cutover performance measurements.
- 13. Cutting over the production system.
- 14. Taking post-cutover performance measurements.
- 15. Reviewing the migration plan:
 - Make changes, as appropriate, to the migration plan.
 - Document everything for use with future migration plans.

Learning about What Is in the TPF 4.1 System

The TPF 4.1 system is an operating system that works with application programs to process transactions for you in a real-time environment. For example, the TPF 4.1 system you can use the TPF 4.1 system for computing needs such as transaction processing, network switching, and front-end processing. The TPF 4.1 system replaces earlier versions of the TPF product. If you require the TPF 4.1 functions, you must migrate to the TPF 4.1 system.

The TPF 4.1 system is designed for businesses and organizations that have high online transaction volumes and large networks. Because of its high capacity and high availability characteristics, the TPF 4.1 system is well-suited for environments where growth is expected to be very fast or unpredictable, or where there are high peak periods of transaction activity. It is especially useful for application programs that need high capacity and extremely low cost per transaction.

Very short path lengths for critical system services such as DASD input/output (I/O) to help make efficient use of the TPF 4.1 system resources and to provide a very low cost per transaction.

This chapter provides an overview of the product features, enhancements, and changes included in the TPF 4.1 system. The remaining chapters provide specific information about migrating from the TPF 3.1 system to the TPF 4.1 system.

Features of the TPF 4.1 System

The TPF 4.1 system includes the base product and the following features:

- High Performance Option (HPO) Feature:

This feature, consisting of the loosely coupled facility and the multiple database function (MDBF), allows the TPF 4.1 system to run in a loosely coupled configuration where each central processing complex (CPC) can share a common database. The HPO feature provides two distinct subfunctions:

- The loosely coupled facility, which allows the TPF 4.1 system to run in a loosely coupled configuration where multiple CPCs can share a common database
- The multiple database function (MDBF), which provides the user with the ability to separate multiple databases physically or logically.

The Multi-Processor Interconnect Facility (MPIF) feature is required for this feature.

See *TPF Main Supervisor Reference* for more information about the HPO feature.

- Multi-Processor Interconnect Facility (MPIF) Feature:

This feature provides an interface that permits TPF CPCs to communicate with each other at a very high speed.

See *TPF Multi-Processor Interconnect Facility Reference* for more information about the MPIF feature.

- TPF Application Requester (TPFAR) Feature:

This feature allows TPF application programs to read and write data directly to IBM DATABASE 2 (DB2) Version 2 Release 3 or later release. The TPFAR feature supports the IBM Systems Application Architecture (SAA) strategy for

database distribution using the remote unit of work method of distributed access. The TPFAR feature implements the requester portion of the Distributed Relational Database Architecture (DRDA), allowing TPF application programmers to send static Structure Query Language (SQL) requests to a remote DB2.

See the *TPF Application Requester User's Guide* for more information about the TPFAR feature.

- TPF Softcopy Publications Feature:

The TPF publications are available:

- Online in a displayable softcopy form. See “Software (Programming Requirements)” on page 196 for more information about the software requirements necessary for using this feature.
- On CD-ROM (collection kit) in:
 - *IBM Online Library Omnibus Edition: MVS Collection*, SK2T-0710
 - *IBM Online Library Omnibus Edition: OS/390 Collection*, SK2T-6700
 - *IBM Online Library: Transaction Processing and Data Collection Kit*, SK2T-0730.

See your IBM representative for more information about how to order a copy of the CD-ROM (collection kit).

Note: IBM C/370 language support, which was a feature with the TPF 3.1 system, is now included in the base product. See the following publications for more information about IBM C language support:

- *TPF Application Programming*
- *TPF C/C++ Language Support User's Guide*.

Areas with Changes or New Functions in the TPF 4.1 System

Table 1 includes changes or new functions from the TPF 3.1 system to the TPF 4.1 system. The information in Table 1 is presented in alphabetic order by the area of change.

Table 1. Areas with Changes or New Functions in the TPF 4.1 System

Area with Changes or New Functions	Description of the Changes or New Functions
ACF/SNA Table Generation	In the TPF 4.1 system, you can write network definitions to tape or general data sets (GDS). You can load Systems Network Architecture (SNA) resource definitions without deactivating the network, and fall back to previous definitions (even if some central processing units (CPUs) have incorporated the new definitions). See “Generating the TPF 4.1 System” on page 203 for more information about ACF/SNA table generation.
Adjacent Link Station (ALS) Attachment	New for the TPF 4.1 system, the ZNETW MOUNT command allows for the dynamic addition of Network Control Programs (NCPs) when the TPF 4.1 system is running as a PU 2.1 host node. Previously, if channel adapters were added, a software IPL was required to make these adapters available for use.
Altering Files	In the TPF 4.1 system, support for the 4-byte MCHR address format was removed. Use the 7-byte MCHR address format in its place.
Automatic Tape Mounting	The TPF 4.1 system supports automatic tape mounting. Alternate (ALT) tapes can be mounted on write-enabled devices as well as converted to active or standby tapes, all without operator intervention.

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
BEGIN Macro	The BEGIN macro no longer appends a 24-byte (hexadecimal 18) header to assembler programs. Online displays of real-time programs now align with the offline assembler listings. Though this does not apply to the C language segments, the C compiler OFFSET option adjusts the offsets in the compiled listings to line up with those on the online system.
Block Checking Mode	<p>New for the TPF 4.1 system, block checking mode is a diagnostic tool provided by the TPF 4.1 system to help flag application programs that access storage improperly. By allocating a single core block for each 4 KB frame of memory and allocating that core block at the end of the frame, the TPF 4.1 system uses the dynamic address translation (DAT) facility to detect improper storage references automatically. This includes application programs that store or reference beyond the end of a core block as well as referencing core blocks that were released.</p> <p>See “Diagnosing Problems and Debugging” on page 293 for more information about block checking mode.</p>
Branch Trace Facility	<p>The TPF 4.1 system supports the IBM ESA/370 branch trace facility.</p> <p>See “Diagnosing Problems and Debugging” on page 293 for more information about the branch trace facility.</p>
Capture and Restore	<p>The Capture and Restore utility controls the maximum number of simultaneous captures allowed for each tape control unit, DASD control unit, DASD channel path, and tape channel path based on the channel path activity. You can set the maximum number of captures allowed for each DASD and tape control unit, and DASD and tape channel path by using a command.</p> <p>See “Learning About the Changes in System Support Services” on page 277 for more information about capture and restore.</p>
Capture and Restore Utility Multipathing	Capture was enhanced to use CHPIDs rather than symbolic device addresses (SDAs) when starting capture activity. This allows Capture to take advantage of multipathing support.
Changes to <16-MB Globals	<p>Virtual addressing is used to map some of the <16-MB global area to real storage above 16 MB, freeing this storage below 16 MB for use by application programs.</p> <p>See “Changes to Application Utilities” on page 311 for more information about globals.</p>
Coexistence Facilitation	Multiple TPF images facilitate coexistence by enabling different images of the TPF control program (CP), restart area components, and program bases to run concurrently on the processors in a loosely coupled complex.
Control Program (CP) is Masked	With few exceptions, the control program (CP) runs masked for I/O interrupts.
Controlling Dump Content	You can control the content of dumps by using the selective memory dump table (SMDT) and the dump override table.
Core Image Restart (CIMR) Area	Multiple TPF images allow for the management of up to eight core image restart (CIMR) areas on the online system. These areas that make up part of the TPF image can be selected dynamically with a hardware IPL. The CIMR records now reside in 4 KB file records and restrictions as to their location on the DASD were removed in this release.

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Core Resident Program Area (CRPA)	The TPF 4.1 system provides two core resident program areas; areas (CRPAs); the 24-bit CRPA, which is located below 16 MB, and the 31-bit CRPA, which is located above 16 MB. The 24-bit CRPA can contain both 24-bit programs and 31-bit programs.
CRETC Enhancements	The CRETC macro was enhanced to permit the passing of a core block to the newly created entry control block (ECB).
Data Alter and Display	<p>The following enhancements were made to Data Alter and Display:</p> <ul style="list-style-type: none"> • ZxPGM now supports display and alter of core image restart (CIMR) area components (such as the control program (CP), IPAT, and so on), as well as the IPL programs. • ZxPGM and ZxCOR now support a Disassemble option. The displays can now be generated in assembler language format. • ZxPGM supports the alter, display, and locking of programs by loadset as well as version code. • ZxCOR supports the alter and display of the system heap storage.
Database Protection by Isolation of Data	In the TPF 4.1 system, the support of the dynamic address translation facility (DAT) and virtual addressing provides for protection of your database by isolating the data used by the application programs. Not only does the TPF 4.1 system map each ECB into its own address space, but the FILE macro and TAPE macro moves the data out of the issuing ECB's address space. These design philosophies result in two levels of database protection. Not only are ECBs prevented from corrupting the data of other ECBs, but an ECB is also unable to corrupt its own once filed or written to tape.
Data Collection and Reduction	<p>The following enhancements were made to data collection and reduction:</p> <ul style="list-style-type: none"> • To permit the collection of file and program interception data on heavily loaded systems, the TPF 4.1 system introduces the SKIP parameter to the SIP DATACO macro. This parameter specifies the number of interceptions to skip for each interception collected. • The TPF 4.1 system implements a new shutdown algorithm that uses the new \$TPCLC macro support. The collection runs shutdown, but all ending records are collected, thereby allowing reduction to process the abbreviated data. <p>Data collection and reduction no longer references a tape named JCD. Rather, data collection and reduction references a real-time tape named RTC.</p>
Data Set Utility	<p>New for the TPF 4.1 system, the Data Set utility allows real-time programs to access data easily and seamlessly on a wide variety of input media. The ZDSMG facility allows you to associate data sets such as a general data set (GDS), general tape, or virtual reader with a data definition name. Real-time programs, through the use of a programmed interface, can then access their input by data definition name rather than using device-specific operations.</p> <p>Note: Virtual reader refers to the IBM VM/ESA facility for supplying input to a virtual machine.</p>
Diagnostic Tools	<p>Several enhancements were made to the branch trace facility, real-time trace (RTT), online minidump, macro trace, system log trace, Enter/Back trace, I/O trace, register trace, program event recording (PER) facility, path information unit (PIU) trace facility, and SNA I/O trace facility.</p> <p>See "Diagnosing Problems and Debugging" on page 293 for more information.</p>

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Dynamic Load Function	You are no longer required to perform an initial program load (IPL) to incorporate new SNA resource definitions following a dynamic load. You are also no longer required to perform an IPL after you fall back to previous SNA resource definitions. Simply enter the ZNOPL MERGE command while the network is running and the TPF 4.1 system is in any TPF system state to incorporate the new SNA resource definitions or fall back to the previous SNA resource definitions.
Enter-By-Name	The program allocation table (PAT) provides an enter-by-name capability that allows the TPF 4.1 system to determine the address of a program at run time so that ENTxC expansions can be resolved at run time.
E-Type Loader (OLDR)	<p>You can load an unlimited number of E-type programs to the TPF 4.1 system by reading them from general data sets (GDS), tapes, virtual readers, or user-defined input devices. You can group these programs into an unlimited number of loadsets, and each loadset can contain an unlimited number of programs. There are a number of E-type loader functions available that you can perform on loadsets or on individual programs in a loadset. You can now use the E-type loader to load:</p> <ul style="list-style-type: none"> • Unallocated programs • New versions of existing IBM C language library functions • IBM TPF Database Facility (TPDFD) programs. <p>Note: Virtual reader refers to the IBM VM/ESA facility for supplying input to a virtual machine.</p> <p>See “Generating the TPF 4.1 System” on page 203 for more information about the E-type loader (OLDR), and “Customizing the Code” on page 229 for more information about activating E-type programs.</p>
E-Type Loader (OLDR) Activation Numbers	<p>In the TPF 4.1 system, the E-type loader (OLDR) support allows you to seamlessly introduce new versions of real-time programs without disrupting existing system activity. This is achieved by assigning an activation number to each ECB when it is created. This activation number corresponds to the latest loadset that was activated in the TPF 4.1 system. Enter/Back services use these activation numbers to ensure that, for the life of the ECB, only programs that were active when the ECB was created are run.</p> <p>See “Generating the TPF 4.1 System” on page 203 for more information about the E-type loader, and “Customizing the Code” on page 229 for more information about activating E-type programs.</p>
Event Table	In the TPF 4.1 system, the event table format was changed to that of a hash table.
FACE Table Generation and the System Initialization Program (SIP)	<p>The file address compute program (FACE) table is generated offline by a new FACE table generator. This simplifies the system initialization process by allowing the FACE table to be generated without running a full SIP.</p> <p>See “Generating the TPF 4.1 System” on page 203 and “Understanding Database Administration” on page 241 for more information about the FACE table and SIP changes.</p>
FACZC Macro	The FACZC macro allows utility programs to access unique records that belong to other I-streams, processors, or subsystem users (SSUs).

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
File Addressing Capacity	<p>The TPF 4.1 system supports two new file addressing formats, which are:</p> <ul style="list-style-type: none"> • File Address Reference Format 4 (FARF4) • File Address Reference Format 5 (FARF5). <p>FARF4 is a migration step between the present File Address Reference Format 3 (FARF3) address scheme and increases from 640 million to addressing up to 4G records. The previous limit of 64 million pool records is removed.</p> <p>FARF3 addresses are still supported but cannot coexist with FARF5 addresses.</p> <p>See “Understanding Database Administration” on page 241 for more information about file addressing.</p>
FINIS Macro	<p>The FINIS macro was updated to include a LTORG. In addition, if space in the segment permits, the date and time that the segment was assembled is included at the end of the program.</p>
Frames, not Blocks	<p>One of the cornerstones of the TPF 4.1 system design is that core blocks are now carved out of 4 KB frames. These frames are attached to the virtual address space of the ECB. This prevents application programs from interfering with each other and allows the TPF control program (CP) to ensure that blocks are not lost if an ECB exits abnormally.</p>
General File Loader (ALDR) Enhancements	<p>User productivity and system management are improved by allowing you to have more control over loading programs and by removing system allocation restrictions. In the TPF 4.1 system, the number of programs that can be allocated was increased from fewer than 33,000 to more than 1,000,000 programs, which improves system management.</p> <p>In addition, the online general file loader (ACPL) keeps track of program versions and assembly data.</p> <p>See “Generating the TPF 4.1 System” on page 203 for more information about the online general file loader (ACPL).</p>
General Real-Time Code Changes	<p>All IBM-provided programs were modified to fully support the TPF 4.1 environment. For example, all programs:</p> <ul style="list-style-type: none"> • Now run in 31-bit addressing mode • Are reentrant • Obtain file addresses of program segments by using the GETPC macro rather than accessing the object code produced by an ENTRC expansion, and use the GETFC macro rather than the GETSC or GETLC macros.
GETCC Macro	<p>The GETCC macro supports the request of a common block in addition to standard core blocks. Blocks (common and standard core) can be initialized to a user-specified hexadecimal value.</p>
GETFC Macro	<p>The GETFC macro was enhanced to request file addresses based on up to 10 record ID attribute table (RIAT) pool attribute types rather than simply prime and overflow attributes.</p> <p>The GETFC macro now supports the request of a common block as well as a standard core block. Blocks (common and standard core) can be initialized to a user-specified hexadecimal value.</p>

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
GETPC Macro	New options were added to the GETPC macro to aid migration to the TPF 4.1 system. The GETPC macro now allows you to request the core or file address of programs with options to specify a particular loadset or program base.
GSYSC Macro	The GSYSC macro was added for ISO-C file resident support. This macro permits an application to allocate system heap storage.
Heap Storage	<p>Heap storage is new for the TPF 4.1 system and is treated as working storage. <i>Heap storage</i> is the total memory pool from which an application program can draw contiguous memory on a dynamic allocation request. The MALOC, CALOC, RALOC, and FREEC macros (and their corresponding IBM C language functions) were introduced to access and manage heap storage.</p> <p>See “Changing Application Programs for Migration” on page 305 for more information about heap storage.</p>
IBM C Language Support	<p>In the TPF 4.1 system, IBM C language support is no longer a product feature. Rather, it is incorporated into the base TPF 4.1 product to allow system and application program growth.</p> <p>See “Operating Environment Requirements and Planning Information” on page 185 for more information about IBM C language support and software requirements.</p>
Improved Dump Speed for CTL Dumps	<p>The speed at which control dumps are taken was improved by enhancing the ability to control the content of the dumps. The selective memory dump facility (SMDF) allows you to tailor the content of dumps by dump number.</p> <p>Use the ZIDOT command or the IDOTB macro to tailor the content of a dump. Overrides can be put in place that remove or add regions of storage to be dumped.</p> <p>See “Customizing the Code” on page 229 for more information about controlling the dump content, and see “Understanding Operations” on page 261 for more information about modifying dump tags.</p>
Improved System Availability	<p>The TPF 4.1 system provides very high system availability. In many cases, the scheduled availability has exceeded 99.9%, which represents fewer than 10 minutes of downtime per week. Even higher availability can be achieved when TPF central processing complexes (CPCs) are run in a loosely coupled configuration.</p> <p>By using the TPF 4.1 system, less downtime is needed for software maintenance because the customer can dynamically change storage allocation values, add SNA terminals without stopping the network, assign new programs online without reinitializing the system to activate the programs, and change program attributes without reinitializing the system to activate the attributes.</p>
Increased Main Storage for Application Program Use	By using the TPF 4.1 system, customer application programs benefit from increased access to storage above and below 16 MB, while maintaining the 24-bit application program interface (API) for existing TPF system software. The concept of virtual storage replaces the concept of real (main) storage.

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Interprocessor Communications (IPC)	<p>Beginning with the TPF 4.1 system, the only supported path for interprocessor communications (IPC) is through the Multi-Processor Interconnect Facility (MPIF). MPIF is a required feature for the High Performance Option (HPO) feature.</p> <p>See “Operating Environment Requirements and Planning Information” on page 185 for more information about IPC.</p>
Input/Output (I/O) Trace	<p>In the TPF 4.1 system, I/O trace can now be recorded by symbolic device address (SDA). This greatly simplifies the debugging of I/O-related problems such as stalled module queues. Calls to common I/O are traced as well as ending status.</p> <p>See “Diagnosing Problems and Debugging” on page 293 for more information about I/O trace.</p>
Keypoints	<p>In the TPF 4.1 system, several changes were made to the usage of TPF keypoints:</p> <ul style="list-style-type: none"> • The CTKX keypoint was moved out of the keypoint area and is now called the image pointer record. • The CTK5 keypoint was added, taking the place of the former CTKX keypoint. This keypoint is reserved for future use by IBM. • The CTK3 keypoint is no longer used by IBM. This processor-unique keypoint is available for your use.
Loading of Core Resident Programs	<p>For more efficient memory utilization, core resident programs are packed into core based on their program length rather than the size of their file allocation. In addition, core resident programs are no longer brought into core along with the core image restart (CIMR) area components. Rather, they are brought into core on demand or are identified for preload with a keyword on their program allocator list (PAL) deck entries.</p>
Lost Tape Interrupts	<p>The TPF 4.1 system supports detection of lost tape interrupts and stalled tape module queues. The TPF 4.1 system now notifies the application program of a permanent error or begins a tape switch when a lost interrupt is detected.</p>
Low Address Protection	<p>The low address protection facility protects the first 512 bytes of storage against any alteration by an application program or the TPF 4.1 system regardless of the storage key used.</p>
Macro Trace Facility	<p>The Macro Trace facility was enhanced for the TPF 4.1 system. Macro trace information is maintained for every ECB in a reserved area of the ECB. This allows dump processing to display macro trace history by ECB in addition to a collating, system-wide trace display.</p> <p>See “Customizing the Code” on page 229 and “Diagnosing Problems and Debugging” on page 293 for more information about diagnostic tools and the macro trace facility.</p>

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Migration Aids	<p>The TPF 4.1 system provides the following migration aids:</p> <ul style="list-style-type: none"> • This publication explains the details of the TPF 4.1 system as they affect your system and application programs. • File Address Reference Format (FARF) migration path, which provides File Address Reference Format 4 (FARF4) as a transition step between File Address Reference Format 3 (FARF3) and File Address Reference Format 5 (FARF5). See “Understanding Database Administration” on page 241 for more information about file addressing capacity. • Virtual-equals-real (VEQR) operating mode provides limited virtual function to help you convert from a nonvirtual TPF system. VEQR mode allows you to run programs that are unchanged from the TPF 3.1 system even though the programs use data-sharing techniques that are no longer supported. When unsupported storage sharing is found, the TPF 4.1 system logs the incident. Running in VEQR mode identifies illegal storage references between address spaces. By using VEQR mode in a test environment, you can test individual programs as you make changes, before modifying your entire application program for the TPF 4.1 system. VEQR mode allows you to migrate your application programs to the TPF 4.1 system gradually. See “Diagnosing Problems and Debugging” on page 293 for more information about VEQR operating mode. • Block-checking mode identifies programs that use block storage management practices that no longer work in the TPF 4.1 system. Block-checking mode marks coding errors such as writing beyond the end of a block, passing blocks chained to other blocks, and using storage that was already released. Block-checking mode can be turned on and off without reinitializing the TPF 4.1 system. See “Diagnosing Problems and Debugging” on page 293 for more information about block-checking mode. • Multiple TPF images function as both a migration aid and by enabling the definition of up to eight images of the TPF system on a single processor to give you greater flexibility in migrating to the TPF 4.1 system. You can maintain images of both the TPF 3.1 system and the TPF 4.1 system, and fall back to a previous program base if necessary.
Multiple Images of the TPF System	<p>Multiple TPF images allows you to define up to eight images of the TPF 4.1 system on a single processor. Maintaining multiple and separate TPF images allows you to integrate program changes more easily by:</p> <ul style="list-style-type: none"> • Permitting you to perform loads while the TPF 4.1 system processes messages without destroying the existing program base • Providing the ability to fall back immediately to a previous program base without reloading the previous program versions. <p>See “Understanding Operations” on page 261 for more information about multiple TPF images.</p>
Multi-Volume Dumps	<p>The TPF 4.1 system supports dumps that span more than one volume. When combined with automatic tape mounting, the dumping of machines with large amounts of real storage is streamlined and greatly simplified.</p>
New CINFC Option	<p>The CINFC A option was added to allow you to access the address of an entry in the CINFC table, simplifying initialization of these areas.</p>

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Non-SNA Communication	<p>Shutdown levels are based on the number of items in the input list rather than on available blocks.</p> <p>See “Understanding Non-SNA Communication” on page 257 for more information about non-SNA communication.</p>
Online Patch Facility	<p>The Online Patch facility is new for the TPF 4.1 system. The ZPTCH command creates and manages patch decks, which are a collection of core alterations. These patch decks are applied in a contiguous, nondisruptive fashion.</p>
Path Information Unit (PIU) Trace Facility	<p>The TPF 4.1 system provides expanded path information unit (PIU) tracing with additional information.</p> <p>Note: Advanced Communications Function/Trace Analysis Program (ACF/TAP) is no longer supported in the TPF 4.1 system.</p> <p>See “Understanding Operations” on page 261 and “Diagnosing Problems and Debugging” on page 293 for more information about the PIU trace facility and diagnostic tools.</p>
Performance Monitoring Enhancements	<p>Several reports are enhanced to be more usable and present additional information. A new report contains a histogram of storage frame usage.</p>
Program Allocation Table (PAT)	<p>The program sharing table (PST) and the online allocator were merged into a single structure called the program allocation table (PAT). The PAT is the control structure for Enter/Back processing. The PAT controls the characteristics of real-time programs such as:</p> <ul style="list-style-type: none"> • 24-bit and 31-bit addressing mode • Restricted macro access • Program residency. <p>The ZxPAT command allows these characteristics to be changed dynamically on the online system.</p> <p>See “Generating the TPF 4.1 System” on page 203 for more information about the program allocation process.</p>
Program Event Recording (PER) Trace Facility	<p>The TPF 4.1 system supports the functions of the IBM ESA/370 program event recording (PER) trace facility for storage alteration and instruction fetching events. The TPF 4.1 system also supports the functions of the IBM ESA/390 PER trace facility for storage alteration, instruction fetching, and successful branching events. There are many enhancements to the system trace facilities in the TPF 4.1 system.</p> <p>See “Diagnosing Problems and Debugging” on page 293 for more information about the PER trace facility.</p>
Program Nesting	<p>Nesting of programs is managed entirely in the address space of the ECB, which greatly enhances system performance. The depth of program nesting is either unlimited or restricted by using the ZCTKA command.</p>
Programs Are 4 KB	<p>All real-time programs are now allocated to 4 KB file records.</p>

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Program Versions and Assembly Data	<p>Information about the version of the programs currently loaded to the online system are maintained in the following ways:</p> <ul style="list-style-type: none"> • The TPF 4.1 system reports the loadset and version of programs through dumps and online displays. • The two-character version code, as well as the assembly date from the program's END card, is maintained in the program version records (PVR). This information is updated whenever programs are loaded by the general file loader (ALDR), auxiliary loader (TLDR), and the E-type loader (OLDR). • The FINIS macro includes the date and time of assembly at the end of the program if space permits. This applies only to assembler segments.
Record Uniqueness	The TPF 4.1 system introduces the ability to define processor and I-stream unique records. This is in addition to the ability that previously existed to define subsystem user-unique records. These records possess these attributes in any combination.
Real-Time Program Management	<p>New for the TPF 4.1 system, the ZAPAT command allows you to dynamically change the allocation attributes of real-time programs. Attributes include:</p> <ul style="list-style-type: none"> • The program's residency • 24-bit and 31-bit addressing mode • Restricted macro authorization.
Record Hold Table	In the TPF 4.1 system, the record hold table format was changed to that of a hash table and a chained table.
Record ID Attribute Table (RIAT)	The record ID attribute table (RIAT) was modified to control records Restore attributes. The Restore attribute may now be modified dynamically by using the ZRTDM command.
Recoup GROUP Macro	<p>The GROUP macro was modified to support specification of I-stream unique records. This macro is used by the Recoup utility to describe the structure of the database.</p> <p>See "Learning About the Changes in System Support Services" on page 277 for more information about the Recoup GROUP macro.</p>
Registers	In the TPF 4.1 system, R10 is now available for your use between SVCs. It will be destroyed when an SVC is issued.
Resource Control	Resource control can maximize the use of available resources under varying system conditions. Utilities and batch processes can be automatically controlled so they do not deplete system resources during peak periods. By adding the capability to time slice CPU-intensive applications, utilities and batch processes can be forced to relinquish control for specified intervals of time, therefore allowing other transactions to process.
RSYSC Macro	The RSYSC macro was added for ISO-C file resident support. This macro permits an application to release system heap storage.
Run-Time Macro Restriction	In the TPF 4.1 system, a program's use of restricted macros can now be authorized at run time. Keywords used in the PAL deck set up a program's basic macro authorization. Authorization can be updated dynamically on the online system by using the ZAPAT command.
Simplified System and Program Allocation	The system allocation process is simplified using the TPF 4.1 system. The system allocator program (SALO) compiles, link-edits, and runs in one job. Before the TPF 4.1 system, allocation was staged in several jobs.

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
SIPCC Function	<p>The SIPCC function was enhanced to support transmission of 4 KB data areas. You can also specify a target I-stream, a list of I-streams, or all I-streams in addition to a target central processing unit (CPU). Enter-by-name support allows interprocessor communications (IPC) to pass program names rather than Enter expansions.</p>
SNA Communication	<p>In the TPF 4.1 system you can install new network definitions without disrupting the network. In addition, you can write network definitions to tape or general data sets (GDSs). The definitions become shared between processors during processing, allowing you to perform either fresh or dynamic loads from any processor in a loosely coupled complex. If problems are found with the network definitions, your installation can fall back to the previous network definitions, regardless of how many CPUs may have incorporated the new resource definitions.</p> <p>In addition to ACF/SNA table generation, many SNA tables were moved above 16 MB, and generic name support (for generic TPF application program names in session requests) was expanded.</p> <p>The SNA polling interval has changed; you can define this interval from 10 milliseconds (ms) to 50 ms, in 10-ms intervals.</p> <p>See “Understanding Systems Network Architecture (SNA) Communication” on page 251 for more information about SNA communication.</p>
SNA I/O Trace Facility	<p>The SNA I/O trace facility is a diagnostic aid used to debug problems with SNA link activation. A 4 KB trace control table is used to record channel contact commands (including read and write XIDS, XID I-fields, and significant steps in XID7 processing for channel-to-channel (CTC) devices). The table is included in a variety of SNA system error dumps.</p> <p>The XID I-field of the SNA I/O trace table contains new types of entries. Therefore, you must modify any tool that uses this table for the new entries.</p> <p>See “Diagnosing Problems and Debugging” on page 293 for more information about diagnostic tools and the SNA I/O trace facility.</p>
Storage Allocation	<p>In the TPF 4.1 system you can change storage allocation values with a command and a re-IPL.</p> <p>See “Understanding Operations” on page 261 for more information about storage allocation and modifying storage allocation values online.</p>
Structured Programming Macros (SPMs)	<p>The TPF 4.1 system now includes the TPF Database Facility (TPPDF) structured programming macros (SPMs). You can use the TPDF SPMs in any TPF 4.1 application even if you do not have the TPDF product installed.</p> <p>See <i>TPPDF and TPF Structured Programming Macros</i> for more information about the SPMs provided with the TPF 4.1 system.</p>
Supervisor Call (SVC) Instruction Definition	<p>An indexed supervisor call instruction (SVC) table structure allows you to define up to 32 767 macros. There are 32 SVCs reserved for your use and odd-numbered SVCs are supported.</p> <p>See “Customizing the Code” on page 229 for more information about SVCs.</p>
Support for >32K Programs	<p>The TPF 4.1 system now supports more than 32 000 real-time programs.</p>

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Support for Format 1 (FMT1) CCWs	TPF device and macro handlers were enhanced to use Format 1 (FMT1) CCWs. This allows access to addresses above 16 MB. If you write file or tape data chains, you are insulated from this change as well as virtual address conversion by the TPF 4.1 system's use of a CCW translation utility.
System Allocator (SALO)	<p>Takes input from as many as 15 input decks and produces the system allocator (SAL) table and the new program allocation table (PAT).</p> <p>In addition, allocation of the SAL table changed for the TPF 4.1 system. See "Generating the TPF 4.1 System" on page 203 and <i>TPF System Generation</i> for more information about allocation of the SAL table.</p>
System Allocator (SAL) Tape	The system allocator (SAL) tape is no longer supported in the TPF 4.1 system.
System Error Number Prefixes	<p>The system error number prefixes are assigned to dump numbers to distinguish between sets of user system error numbers and IBM system error numbers.</p> <p>See "Customizing the Code" on page 229 for more information about prefixes.</p>
System Error Support	<p>You can control the content of a TPF dump, which is divided into two sections:</p> <ul style="list-style-type: none"> • The processor status, trace control tables, and virtual memory for message address spaces • System storage areas. <p>In the TPF 4.1 system, system error options are no longer subsystem unique. You can define multiple sets of system error numbers and specify additional main storage areas to be dumped. Dumps can also span multiple tape volumes.</p>
System Initialization	System initialization is easier in the TPF 4.1 system. The file address compute program (FACE) table generation is handled by a new offline FACE table generator program rather than as part of the system initialization process (SIP).
System Service Request	<p>Enhancements to the macro decoder and supervisor call (SVC) instruction definitions increase the ability of an application program to request system services.</p> <p>The primary interfaces for application program requests of system services are through macros using the SVC and fast-link macro decoders. Fast-link macros are macros that do not issue SVCs. In the TPF 4.1 system, the SVCs allocated for use are increased from 128 to 255, and the SVCs reserved for your use are increased from 1 to 32. In addition, 2 SVC entries (one reserved for IBM use and one for your use) can be reserved to support a second-level structure. With this secondary or indexed structure, you can define more than 32 000 additional macros.</p> <p>One hundred fast-link macros are reserved for use by your application programs. Fast-link macros are more expedient than other macros because they do not issue SVCs that cause system interrupts.</p> <p>Certain restricted-use TPF system macros now check the authorization level of the requesting program before providing the system service. If a program requests a service that it is not authorized to obtain, the service is not granted. This authorization level is specified as part of the program allocation information.</p>

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
System Trace Control	<p>By using the ZSTRC command you can display or change the activity of the system trace facilities. These traces include:</p> <ul style="list-style-type: none"> • Branch • Enter/Back • Input/Output (I/O) • Macro.
Tape Support	<p>In the TPF 4.1 system, the following changes were made to tape support and can be done without operator intervention:</p> <ul style="list-style-type: none"> • Mount alternate (ALT) tapes on write-enabled devices • Convert ALT tapes to active tapes for tape macro processing • Convert ALT tapes to standby tapes for tape switching. Automatically mounting ALT tapes improves tape switching during the dump process, enabling you to minimize the number of tape devices used by a multiple volume tape dump. <p>In addition, the TPF 4.1 system:</p> <ul style="list-style-type: none"> • Detects and reports long or lost tape interrupts and stalled module queue conditions • Supports only 3480 and 3490 tape and tape control devices. <p>See “Learning About the Changes in System Support Services” on page 277 for more information about tape support.</p>
TDSPC Enhancements	<p>In the TPF 4.1 system, TDSPC can now be used to query the length of the specified tape module queue.</p>
Timer Rate Change	<p>The CPU loop timer interval was shortened to 10ms. This speeds polling of channel-attached communications controllers.</p>
\$TCPLC Macro	<p>The new \$TCPLC macro supports writing to real-time tapes from the control program (CP).</p>
TPF Advanced Program-to-Program Communications (TPF/APPC)	<p>The TPF 4.1 system includes additional base APPC functions to TPF Advanced Program-to-Program Communications (TPF/APPC) support to complete TPF system support of all APPC base functions, including mapped conversations (for the C language interface only) and parallel sessions.</p> <p>The TPF/APPC mapped interface is based on the communication element of the IBM Systems Application Architecture (SAA) Common Programming Interface (CPI). Although TPF/APPC does not fully conform to CPI communication, standard CPI communication programs can be converted easily, provided the programs do not use the features that the TPF system does not support. See the <i>TPF C/C++ Language Support User's Guide</i> for more information about the C language functions.</p> <p>The maximum number of LU 6.2 sessions increased to 8 million.</p> <p>The TPF 4.1 system also adds some of the optional functions defined by the LU 6.2 architecture.</p> <p>See “Understanding Systems Network Architecture (SNA) Communication” on page 251 for more information about TPF/APPC.</p>
TPF Database Facility (TPFDF)	<p>In the TPF 4.1 system, E-type loader fully supports the IBM Transaction Processing Facility Database Facility (TPFDF) product.</p>

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions																								
User Core Image Restart (CIMR) Areas	<p>The TPF 4.1 system introduces 2 new core image restart (CIMR) area components that are available for your use.</p> <table> <tr> <th data-bbox="626 359 781 386">Component</th><th data-bbox="818 359 948 386">Description</th></tr> <tr> <td data-bbox="626 405 688 432">USR1</td><td data-bbox="818 405 1235 432">A subsystem-shared CIMR component.</td></tr> <tr> <td data-bbox="626 451 688 478">USR2</td><td data-bbox="818 451 1235 478">A subsystem-unique CIMR component.</td></tr> </table> <p>These components can be loaded with either the general file loader (ALDR) or the auxiliary loader (TLDR).</p>	Component	Description	USR1	A subsystem-shared CIMR component.	USR2	A subsystem-unique CIMR component.																		
Component	Description																								
USR1	A subsystem-shared CIMR component.																								
USR2	A subsystem-unique CIMR component.																								
User Exits	<p>The TPF 4.1 system introduces an array of new user exits in the following areas.</p> <table> <tr> <th data-bbox="626 646 683 674">Area</th><th data-bbox="1008 646 1138 674">Description</th></tr> <tr> <td data-bbox="626 693 675 720">CLH</td><td data-bbox="1008 693 1450 810">In centralized list handling (CLH), user exits for getting and releasing blocks, which include ECBs, system work blocks (SWBs), and common blocks.</td></tr> <tr> <td data-bbox="626 829 683 856">CTIN</td><td data-bbox="1008 829 1365 911">User exit for initialization and key protection of tables as well as initialization of user CINFC labels.</td></tr> <tr> <td data-bbox="626 930 789 957">Data Set Utility</td><td data-bbox="1008 930 1422 987">User exits for management of a virtual reader and user-defined input devices.</td></tr> <tr> <td data-bbox="626 1005 878 1033">E-Type Loader (Offline)</td><td data-bbox="1008 1005 1455 1062">User exit for offline control of programs to be loaded with the E-type loader.</td></tr> <tr> <td data-bbox="626 1081 878 1108">E-Type Loader (Online)</td><td data-bbox="1008 1081 1446 1222">User exits for ZOLDR authorization, display interception, programs not entered through the normal enter mechanism, loadset history, program history, and selective program activation.</td></tr> <tr> <td data-bbox="626 1241 695 1268">ESPM</td><td data-bbox="1008 1241 1430 1323">Hook in the CPU timer interrupt routine for the System Performance Monitor package.</td></tr> <tr> <td data-bbox="626 1341 753 1369">FACE Table</td><td data-bbox="1008 1341 1450 1459">In the file address compute program (FACE) table, a mechanism providing access to FACE table header, split chain, and split.</td></tr> <tr> <td data-bbox="626 1478 781 1505">Indexed SVCs</td><td data-bbox="1008 1478 1430 1505">User exit for the indexed SVC decoder.</td></tr> <tr> <td data-bbox="626 1524 769 1551">System Error</td><td data-bbox="1008 1524 1406 1642">User exit for the dump override table (DOT), modification of program event recording (PER) data, and viewing of dump data.</td></tr> <tr> <td data-bbox="626 1661 688 1688">OLDF</td><td data-bbox="1008 1661 1430 1717">Hook in System Error for support of the online mini dump facility.</td></tr> <tr> <td data-bbox="626 1736 716 1764">WTOPC</td><td data-bbox="1008 1736 1357 1793">User exit for WTOPC PAGE size selection.</td></tr> </table>	Area	Description	CLH	In centralized list handling (CLH), user exits for getting and releasing blocks, which include ECBs, system work blocks (SWBs), and common blocks.	CTIN	User exit for initialization and key protection of tables as well as initialization of user CINFC labels.	Data Set Utility	User exits for management of a virtual reader and user-defined input devices.	E-Type Loader (Offline)	User exit for offline control of programs to be loaded with the E-type loader.	E-Type Loader (Online)	User exits for ZOLDR authorization, display interception, programs not entered through the normal enter mechanism, loadset history, program history, and selective program activation.	ESPM	Hook in the CPU timer interrupt routine for the System Performance Monitor package.	FACE Table	In the file address compute program (FACE) table, a mechanism providing access to FACE table header, split chain, and split.	Indexed SVCs	User exit for the indexed SVC decoder.	System Error	User exit for the dump override table (DOT), modification of program event recording (PER) data, and viewing of dump data.	OLDF	Hook in System Error for support of the online mini dump facility.	WTOPC	User exit for WTOPC PAGE size selection.
Area	Description																								
CLH	In centralized list handling (CLH), user exits for getting and releasing blocks, which include ECBs, system work blocks (SWBs), and common blocks.																								
CTIN	User exit for initialization and key protection of tables as well as initialization of user CINFC labels.																								
Data Set Utility	User exits for management of a virtual reader and user-defined input devices.																								
E-Type Loader (Offline)	User exit for offline control of programs to be loaded with the E-type loader.																								
E-Type Loader (Online)	User exits for ZOLDR authorization, display interception, programs not entered through the normal enter mechanism, loadset history, program history, and selective program activation.																								
ESPM	Hook in the CPU timer interrupt routine for the System Performance Monitor package.																								
FACE Table	In the file address compute program (FACE) table, a mechanism providing access to FACE table header, split chain, and split.																								
Indexed SVCs	User exit for the indexed SVC decoder.																								
System Error	User exit for the dump override table (DOT), modification of program event recording (PER) data, and viewing of dump data.																								
OLDF	Hook in System Error for support of the online mini dump facility.																								
WTOPC	User exit for WTOPC PAGE size selection.																								

Table 1. Areas with Changes or New Functions in the TPF 4.1 System (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Virtual File Access (VFA)	<p>To improve performance in the TPF 4.1 system, virtual file access (VFA) is always present and active. You can run programs directly from VFA, thereby improving system performance. The online and offline VFA performance monitoring facilities improve your ability to better tune VFA candidates and VFA resources.</p> <p>See “Understanding Database Administration” on page 241 for more information about VFA.</p>
Working Storage and 16-MB Constraint Relief (Transaction Protection and Data Integrity)	<p>The TPF 4.1 system uses the dynamic address translation (DAT) facility of the IBM ESA/370 architecture to view working storage above 16 MB as if it was below 16 MB. The ESA facilities of primary address space and home address space are implemented in the TPF 4.1 system as the ECB virtual memory (EVM) and the system virtual memory (SVM), respectively.</p> <p>The TPF 4.1 system separates and isolates information into types of address spaces for system processing and message processing. Through the use of the DAT facility and low address protection, the TPF 4.1 system changes how storage is physically and logically used for system programs, application programs, and messages. The introduction of virtual address spaces in the TPF environment has significantly increased the integrity of the data environment in the TPF 4.1 system. The TPF 4.1 system also provides the basic tools needed for additional data integrity and recovery.</p> <p>See “Generating the TPF 4.1 System” on page 203 for more information about working storage.</p>
WTOPC Macro Enhancements	<p>The following enhancements were made to the WTOPC macro.</p> <ul style="list-style-type: none"> • The WTOPC macro now provides a centralized management system for long output messages. The WTOPC PAGE facility allows command writers that would potentially display a limitless amount of data to present the data in smaller page-sized pieces. The new ZPAGE command allows you to request the next page of output. The WTOPC PAGE facility provides page sizes for remote and local consoles as well as a user exit to allow facility-specific tailoring of output presentation. SNA display messages and E-type loader display messages now take advantage of the WTOPC PAGE facility. • CHAIN=YES processing was redesigned to significantly reduce the system resources consumed by users of this facility. CHAIN=YES now uses fewer ECBs and core blocks • UNSOL=YES allows command writers that send unsolicited messages to send them using the Unsolicited Message package. This helps to prevent potential data loss when sending to older remote consoles.
WTOPC Paging Control	<p>New for the TPF 4.1 system, the ZPAGE command is used to pass a continuation request to the WTOPC PAGE facility. The ZPAGE command provides a single, centralized operator interface for commands that use the WTOPC PAGE facility.</p>
ZFMSG Facility	<p>New for the TPF 4.1 system, the ZFMSG facility allows you to dynamically define and change various characteristics of the TPF commands. You can create new commands, define their editor segments and describe the functional support consoles (FSCs) that should receive output, as well as change any of these characteristics for existing commands.</p>
3-Byte Resource Identifier (RID)	<p>In the TPF 4.1 system, a 3-byte resource identifier (RID) allows you to increase the number of logical units (LUs) that you can use. The maximum number of LU sessions (other than LU 6.2) increased to 8 million.</p>

Summarizing the New, Changed, and Obsolete Interfaces

This chapter summarizes new and changed interfaces, as well as those that are no longer supported for the TPF 4.1 system, including:

- System initialization program (SIP) macros and statements
- System communication keypoint (SCK) generation macros
- General and system macros
- Advanced Program-to-Program Communications (APPC) macros
- SNA communication macros
- Program test vehicle (PTV) macros
- Data macros
- IBM C language support functions and header files
- User exits
- Control program interface (CINFC) tags
- Configuration constant (CONKC) tags
- System equates
- Commands
- System error, online, and offline messages
- Offline ACF/SNA table generation (OSTG) messages
- Fixed file records
- Segments
- Control programs
- CP copy members.

How to Read the Tables

Each table that follows identifies the name of the interface, and describes what is new, changed, or no longer supported. Where additional information about the interface is required for migration, there is a reference to another section of the publication.

The information in each table is ordered sequentially or alphabetically depending on the type of information presented. To help you better understand the content of each table, a description of the various column headings follows in Table 2.

Table 2. How to Read the Tables

Column Heading	Description
APPC Macro	Indicates the name of the Advanced Program-to-Program Communications (APPC) macro.
CINFC Tag	Indicates the name of the CINFC tag.
CONKC Tag	Indicates the name of the CONKC tag.
Data Macro	Indicates the name of the data macro.
Description of Change	Provides a description of the entity or the changes made to it.
Do You Need to Reassemble Programs?	Indicates whether you must reassemble programs (Yes, No, or Not Applicable).
Do You Need to Reassemble Programs Using This Data Macro?	Indicates whether you must reassemble programs using the data macro (Yes, No, or Not Applicable).

Table 2. How to Read the Tables (continued)

Column Heading	Description
Do You Need to Recompile?	Indicates whether you must recompile programs (Yes, No, or Not Applicable).
Equate Value	Indicates the equate value.
Function	Indicates the name of the function.
Command	Indicates the name of the command.
General Macro	Indicates the name of the general macro.
Header File	Indicates the name of the general use C language header file.
Information-Only Macro	Indicates the name of the information-only macro.
Message ID or System Error Number	Indicates the message ID for the offline or online message, or the system error number for the system error.
Message Type	Indicates whether the message is an offline message, online message, or system error.
New, Changed, or No Longer Supported	Indicates whether an entity is new, changed, or no longer supported because of the new function or SPE.
PTV Macro	Indicates the name of the program test vehicle (PTV) macro.
SCK Macro	Indicates the name of the system communication (SCK) general macro.
Segment	Indicates the name of the segment.
Selected Equate Macro	Indicates the name of the selected equate macro.
SIP Skeleton and Internal Macro	Indicates the name of the SIP skeleton and internal macro.
SIP Stage I Macro	Indicates the name of the SIP Stage I macro.
SIP Stage II Macro	Indicates the name of the SIP Stage II macro.
SNA Communication Macro or Statement	Indicates the name of the SNA communication macro or statement.
Structured Programming Macro (SPM)	Indicates the name of the SPM.
Structured Programming Macro (SPM) (IBM Use Only)	Indicates the name of the SPM (IBM use only).
SYSEQ Tag	Indicates the name of the SYSEQ tag.
System Macro	Indicates the name of the system macro.
System Macro (IBM Use Only)	Indicates the name of the system macro (IBM use only).
Type	Indicates the type of segment.
User Exit Activated In	Indicates the name of the segment in which the user exit is activated.
User Exit Program	Indicates the name of the user exit program.
User Routine Label	Indicates the name of the user routine label.

SIP Macros and Statements

The system initialization program (SIP) now contains both macros and statements. Macros are used by SIP Stage I to define your system, and assembled. Statements provide input to the new offline file address compute program (FACE) table generator (FCTBG).

Table 3 on page 25 summarizes SIP Stage I macros and statement changes for the TPF 4.1 system. “Generating the TPF 4.1 System” on page 203 describes other system generation changes you must make to migrate to the TPF 4.1 system.

Table 3. Changes to SIP Stage I Macros and Statements for the TPF 4.1 System

SIP Stage I Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
ALLOC	No Longer Supported	Yes
BSNCT	Changed	Yes
CONFIG	Changed	Yes
CORREQ	Changed	Yes
CRASTB	Changed	Yes
DATA CO	Changed	Yes
DDCCAP	Changed	Yes
GENFIL	Changed	Yes
GENSIP	Changed	Yes
GLOBAL	Changed	Yes
G POLL	No Longer Supported	Not Applicable
IBMPAL	New	Not Applicable
INDSN	New	Not Applicable
MSGRTA	Changed	Yes
ONLFIL	Changed	Yes
RAM	Changed	Yes
RAMFIL	Changed	Yes
RESCAP	Changed	Yes
SSDEF	Changed	Yes
TSC	No Longer Supported	Not Applicable
UFTFTI (See Note 1.)	New	Not Applicable
Notes: 1. With program update tape (PUT) 3, the new UFTIX parameter was added to this macro. See <i>TPF System Generation</i> for more information about the UFTIX parameter that was added.		

SIP Skeletons and Internal Macros (Inner Macros)

If you made changes to any of the SIP internal macros in the TPF 3.1 system, beware that there are many changes to these macros for the TPF 4.1 system.

Table 4 summarizes the SIP skeleton and internal macro changes for the TPF 4.1 system.

Table 4. Changes to SIP Skeleton and Internal Macros for the TPF 4.1 System

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CKTYPC	New	Not Applicable
FACEB	No Longer Supported	Yes
GENC	Changed	Yes
GEND	Changed	Yes
GENFD	Changed	No
GENR	Changed	Yes

Table 4. Changes to SIP Skeleton and Internal Macros for the TPF 4.1 System (continued)

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
GENR1	No Longer Supported	Not Applicable
GENR2	No Longer Supported	Not Applicable
GENSTC	Changed	Yes
ISKLG	Changed	Yes
PAL	No Longer Supported	Not Applicable
SKALOC	No Longer Supported	Not Applicable
SKANTD	Changed	Yes
SKBXAX	Changed	Yes
SKCC0C	Changed	Yes
SKCHEK	Changed	Yes
SKCTKA	Changed	Yes
SKCTKB	Changed	No
SKCTKE	Changed	Yes
SKCTKI	Changed	No
SKCTKM	Changed	Yes
SKCTKP	No Longer Supported	Not Applicable
SKCTKV	Changed	Yes
SKCTKX	Changed	Yes
SKCTK6	Changed	Yes
SKCYMZ	No Longer Supported	Not Applicable
SKDASD	New	Not Applicable
SKDRID	No Longer Supported	Not Applicable
SKECBD	No Longer Supported	Not Applicable
SKFCTB	No Longer Supported	Not Applicable
SKFMTR	Changed	Yes
SKFUNC	New	Not Applicable
SKGLB	Changed	Yes
SKGLBK	Changed	Yes
SKIPAT	New	Not Applicable
SKJPCO	Changed	Yes
SKLINQ	Changed	Yes
SKMSCQ	New	Not Applicable
SKOPMA	No Longer Supported	Not Applicable
SKPAL	No Longer Supported	Yes
SKRCIT	Changed	Not Applicable
SKRIAT	No Longer Supported	Not Applicable
SKRID	No Longer Supported	Yes
SKSET	Changed	Yes
SKSETK	Changed	No

Table 4. Changes to SIP Skeleton and Internal Macros for the TPF 4.1 System (continued)

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SKSIGT	Changed	No
SKSNCT	Changed	Yes
SKSSET	Changed	Not Applicable
SKSTCQ	No Longer Supported	Not Applicable
SKSYCN	Changed	Yes
SKSYPS	Changed	Not Applicable
SKSYSQ	No Longer Supported	Yes
SPASM	Changed	Yes
SPASMS	Changed	Not Applicable
SPCPTB	No Longer Supported	Yes
SPDASD	Changed	Yes
SPEDCC	Changed	Yes
SPERR	Changed	Yes
SPERRG	Changed	Yes
SPGLB	Changed	Yes
SPGLOB	Changed	Not Applicable
SPKEY	No Longer Supported	Yes
SPPGML	Changed	Yes
SPREPT	Changed	Yes
SPRIAT	Changed	Yes
SPTABS	Changed	Not Applicable
SRIAT	No Longer Supported	Not Applicable
SYPGMSET	No Longer Supported	Not Applicable
TPSETC	New	Not Applicable
VERCHG	Changed	Yes

SIP Stage II Macros

Table 5 summarizes the SIP Stage II macro changes for the TPF 4.1 system.

Table 5. Changes to SIP Stage II Macros for the TPF 4.1 System

SIP Stage II Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
BXAXFA	Changed	Yes
FACEA	No Longer Supported	Not Applicable
FACEC	No Longer Supported	Not Applicable
RIATA	Changed	Yes
SPCDRV	Changed	Yes

System Communication Keypoint (SCK) Generation Macros

Table 6 summarizes the system communication keypoint (SCK) macro changes for the TPF 4.1 system.

Table 6. Changes to System Communication Keypoint (SCK) Macros for TPF 4.1 System

SCK Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SKLNG	Changed	Yes

General and System Macros

Starting with the TPF 4.1 system, there are separate publications for general and system macros, rather than one publication as was provided with the TPF 3.1 system:

- *TPF General Macros*, which contains general use macros.
- *TPF System Macros*, which contains restricted and information-only macros.

In addition, invocation of macro parameters is described using IBM BookMaster syntax diagrams.

General Macros

Table 7 summarizes the general macro changes for the TPF 4.1 system.

Table 7. Changes to General Macros for the TPF 4.1 System

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
ASURC	No Longer Supported	Not Applicable
ATTAC	Changed	No (See Note 1 on page 30.)
BACKC	Changed	No
BEGIN	Changed	No
BPKDC	Changed	Yes
CALOC	New	Not Applicable
CCIDC	Changed	No
CFISVC	New	Yes (See Note 5 on page 30.)
CINFC	Changed	No
CONKC	Changed	No
CRATC	Changed	No (See Note 1 on page 30.)
CREDC	Changed	No
CREEC	Changed	No
CREMC	Changed	No
CRESVC	New	Yes (See Note 5 on page 30.)
CRETCT	Changed	No
CREXC	Changed	No
CTBLC	No Longer Supported	Not Applicable
CVTPC	New	Not Applicable
CYCPC	Changed	Yes (See Note 2 on page 30.)

Table 7. Changes to General Macros for the TPF 4.1 System (continued)

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
DETAC	Changed	No (See Note 1 on page 30.)
DPROC	Changed	No (See Note 1 on page 30.)
EDITA	Changed	No
ENTDC	Changed	No
ENTNC	Changed	No
ENTRC	Changed	No
FILKW	Changed	No
FINIS	Changed	No
FLIPC	Changed	No (See Note 1 on page 30.)
FREEC	New	Not Applicable
GDSPC	Changed	No
GENMSG	Changed	No
GETCC	Changed	No
GETFC	Changed	No
GLOUC	Changed	No
GROUP	Changed	Yes
ICELOG	Changed	No
ICLANC	Changed	No
ICPLOG	Changed	No
IDATG	New	Not Applicable
IFRVTC	New	Not Applicable
IFSMC	Changed	Yes
INQRC	Changed	Yes
ISNSE	Changed	Yes
LINEQ	Changed	Yes
LISTC	Changed	No
LSTSC	No Longer Supported	Not Applicable
MALOC	New	Yes
MODEC	Changed	No (See Note 1 on page 30.)
NTYPC	No Longer Supported	No
PNAMC	Changed	Not Applicable
POLLC	No Longer Supported	Not Applicable
RALOC	New	Not Applicable
RCATC	Changed	No (See Note 4 on page 30.)
REQSC	No Longer Supported	Not Applicable
RIDCC	Changed	Yes
RTCUC	Changed	No (See Note 1 on page 30.)
RVTCC	Changed	No (See Note 1 on page 30.)
SANSC	No Longer Supported	Not Applicable

Table 7. Changes to General Macros for the TPF 4.1 System (continued)

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SCDCC	No Longer Supported	Not Applicable
SELEC	Changed	Yes
SEOMC	No Longer Supported	Not Applicable
SIZBC	Changed	Yes
SNAPC	Changed	Yes
SNIAC	No Longer Supported	Not Applicable
SONIC	Changed	No (See Note 1.)
STXTC	No Longer Supported	No
SWISC	Changed	No
SYSRA	Changed	No
SYSTC	Changed	Yes
TCLSC	Changed	No
TCTLC	No Longer Supported	Not Applicable
TDSPC	Changed	No
TIMEC	Changed	No (See Note 1.)
TOURC	Changed	No (See Note 3.)
TOUTC	Changed	No (See Note 3.)
TSYNC	Changed	No
TYPBC	Changed	Yes
UATBC	Changed	No (See Note 1.)
URCTC	Changed	No
VALTC	Changed	Yes
WTOPC	Changed	No
Notes: <ol style="list-style-type: none"> 1. If the segment that contains this macro is not reassembled, then the segment must be allocated as 24-bit. 2. The CYCPC macro generates a CROSC macro if the default values are used. Programs that use the CROSC macro require restricted macro authorization unless a specific parameter is coded. 3. If you are running TPF 3.1 object code on the TPF 4.1 system, any segments using the TOURC and TOUTC macros must be reloaded since the VCON for the real-time tape is now resolved at macro time. 4. The RCATC macro is not compatible between the TPF 3.1 system and the TPF 4.1 system and must be recreated due to the RCATSWIS field (the SWISC enter expansion). 5. All user segments using the CFISVC and CRESVC macros should be reassembled. 		

System Macros

Table 8 on page 31 summarizes the system macro changes for the TPF 4.1 system. System macros fall into these categories:

- Macros for which authorization is required. See “Issuing Macros that Require Authorization” on page 310 for more information.

- CP-restricted macros
- Information-only macros.

Table 8. Changes to System Macros for the TPF 4.1 System

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
#SBRC	Changed	No
\$CCWBC	New	Not Applicable
\$CCWTC	New	Not Applicable
\$CKMAC	New	Not Applicable
\$CONBC	New	Not Applicable
\$DCOLC	New	Not Applicable
\$DISBC	New	Not Applicable
\$GCOMC	New	Not Applicable
\$GETBC	New	Not Applicable
\$GEVAC	New	Not Applicable
\$GIOBC	New	Not Applicable
\$GMNBC	New	Not Applicable
\$GSVAC	New	Not Applicable
\$GSWBC	New	Not Applicable
\$LOCKC	Changed	Not Applicable (See Note 1 on page 34.)
\$MASKC	New	Not Applicable
\$MONTC	Changed	Yes
\$PATC	New	Not Applicable
\$RCOMC	New	Not Applicable
\$REVC	New	Not applicable
\$RELBC	New	Not Applicable
\$RIOBC	New	Not Applicable
\$RMNBC	New	Not Applicable
\$RSWBC	New	Not Applicable
\$SWSPC	New	Not Applicable
\$TCPLC	New	Not Applicable
\$UNLKC	Changed	Some (See Note 2 on page 34.)
\$VALEC	New	Not Applicable
ADDFC	Changed	No
ADDLC	Changed	No
ASURC	No Longer Supported	Not Applicable
ATOLC	No Longer Supported	Not Applicable
BBWRT	Changed	Yes
BLKBC	No Longer Supported	Not Applicable
BRSTR	Changed	Yes
BSAVE	Changed	Yes

Table 8. Changes to System Macros for the TPF 4.1 System (continued)

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
BSCQC	New	Not Applicable
CEBIC	Changed	Some (See Note 3 on page 34.)
CIOUC	Changed	No
CLHCC	No Longer Supported	Not Applicable
CLHEC	No Longer Supported	Not Applicable
CLNKC	Changed	No
CPDSC	Changed	Yes
CPRND	Changed	No
CROSC	Changed	Yes
CTBLC	No Longer Supported	Not Applicable
CWRTC	Changed	Yes
CXFRC	Changed	Yes
CYDNC	New	Not Applicable
CZ1CP	Changed	No
DSDAC	Changed	No
ELLEC	Changed	Yes
ESFAC	New	No Applicable
FACZC	New	Not Applicable
FCTL	Changed	Yes
FDCTC	Changed	No
FLFAC	Changed	Yes
FLSPC	Changed	Yes (See Note 7 on page 34.)
FLVFC	New	No
FNSPC	Changed	Yes (See Note 7 on page 34.)
GDSCC	Changed	Yes
GETBC	No Longer Supported	Not Applicable
GETPC	Changed	Yes
GIOBC	No Longer Supported	Not Applicable
GSVAC	New	Not Applicable
GTMB	No Longer Supported	Not Applicable
HIOSC	Changed	No
IBMSVC	New	Not Applicable
ICALL	Changed	No
IGATC	Changed	No (See Note 4 on page 34.)
ILCKCB	Changed	Yes
IPSVE	Changed	Yes
IPURGE	Changed	Yes
ISDAC	Changed	No

Table 8. Changes to System Macros for the TPF 4.1 System (continued)

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IULKCB	Changed	Yes
LCPCC	New	Not Applicable
LEBIC	Changed	Yes
LSTSC	No Longer Supported	Not Applicable
MATRC	No Longer Supported	Not Applicable
MAXBC	Changed	Yes
MONWC	Changed	Not Applicable
MOVEC	New	Not Applicable
MPIFC	Changed	Yes
MSDAC	Changed	No
MSGMC	Changed	Yes
NUMBC	Changed	Yes
NXTBC	No Longer Supported	Not Applicable
NXTPC	Changed	No
NXTRC	New	Not Applicable
ORDBC	No Longer Supported	Not Applicable
PERCC	New	Not Applicable
PHYBC	Changed	Yes
PKEYC	Changed	Yes
PLNAC	Changed	Yes
PMOCN	Changed	Yes
POLLC	No Longer Supported	Not Applicable
PROGC	New	Not Applicable
RCSSC	Changed	No
RCSTC	Changed	Yes
RELBC	No Longer Supported	Not Applicable
RELPC	Changed	Yes
REQSC	No Longer Supported	Not Applicable
RESMC	Changed	No
RIOBC	No Longer Supported	Not Applicable
RIOSC	Changed	No
RITID	Changed	Yes
RLMBC	No Longer Supported	Not Applicable
RLNKC	Changed	No
SANSC	No Longer Supported	Not Applicable
SCDCC	No Longer Supported	Not Applicable
SENDC	Changed	Some (See Note 5 on page 34.)
SERRC	Changed	Some (See Note 6 on page 34.)

Table 8. Changes to System Macros for the TPF 4.1 System (continued)

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SETDC	No Longer Supported	Not Applicable
SICFC	New	Not Applicable
SIOSC	Changed	No
SIPCC	Changed	Yes
SLCQC	New	Not Applicable
SLNKC	Changed	No
SNDLC	Changed	No
SOUTC	Changed	Yes
STPLC	No Longer Supported	Not Applicable
STTLC	No Longer Supported	Not Applicable
STXTC	No Longer Supported	Not Applicable
SWCHC	Changed	No
TCTLC	No Longer Supported	Not Applicable
TDCTC	Changed	No
TDTAC	Changed	No
TIOSC	Changed	No
TPCNC	Changed	No
TPINC	Changed	No
UXITC	Changed	Yes
VALBC	Changed	Yes
WTO6C	Changed	No
WTO7C	Changed	No
Notes: <ol style="list-style-type: none"> 1. Segments coding the IMMED= parameter must be reassembled. 2. Segments coding the FORCE= parameter must be reassembled. 3. Only CP code needs to be reassembled. 4. If the segment that contains this macro is not reassembled, then the segment must be allocated as 24-bit. 5. Type S support was removed. 6. The MD and CLIST parameters are no longer supported. 7. The FNSPC and FLSPC macros are only supported when using the Extended option. If a FNSPC or a FLSPC macro is issued without the Extended option, the TPF 4.1 system issues a CTL-00002D dump and exits the ECB. 		

Information-Only Macros

Table 9 summarizes the information-only macro changes for the TPF 4.1 system.

Table 9. Changes to Information-Only Macros for the TPF 4.1 System

Information-Only Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CLHCC	No Longer Supported	Not Applicable
CLHEC	No Longer Supported	Not Applicable

Table 9. Changes to Information-Only Macros for the TPF 4.1 System (continued)

Information-Only Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SSCCP	Changed	Yes

Structured Programming Macros (SPMs)

Table 10 summarizes the structured programming macro (SPM) changes for the TPF 4.1 system. See *TPFDF and TPF Structured Programming Macros* for a complete description of all structured programming macros.

Table 10. Changes to Structured Programming Macros (SPMs) for the TPF 4.1 System

Structured Programming Macro (SPM)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
WHEN	Changed	No

Structured Programming Macros (SPMs) (IBM Use Only)

Table 11 summarizes the structured programming macro (SPM) (IBM use only) changes for the TPF 4.1 system.

Table 11. Changes to Structured Programming Macros (SPMs) (IBM Use Only) for the TPF 4.1 System

Structured Programming Macro (SPM) (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
WKRGC	Changed	No

Selected Equate Macros

Table 12 summarizes the selected equate macro changes for the TPF 4.1 system.

Table 12. Changes to Selected Equate Macros for the TPF 4.1 System

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
BRPEQ	Changed	Yes
CAIEQ	Changed	No
CLHEQ	Changed	Yes
CPSEQ	Changed	No
CVMEQ	No Longer Supported	Not Applicable
C20CP	Changed	Yes
ECBEQ	Changed	Some (See Note 1 on page 36.)
ECBUEQ	No Longer Supported	Not Applicable
FILMEQ	No Longer Supported	Not Applicable
IBXEQ	New	Not Applicable
LINEQ	Changed	Yes
LOCEQ	Changed	Yes
MAPEQ	Changed	No

Table 12. Changes to Selected Equate Macros for the TPF 4.1 System (continued)

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
NODEQ	Changed	Yes
OMTEQ	Changed	No
PIUEQ	Changed	Yes
PTVEQ	Changed	Yes
REGEQ1	Changed	No
RITEQ	Changed	Yes
RTCEQ	Changed	No
RTTEQ	Changed	Yes
SNAEQ	Changed	Yes
SYCON	Changed	Yes
SYSEQ	Changed	Yes
TAPEQ	Changed	Yes
TPLEQ	No Longer Supported	Not Applicable
TRMEQ	Changed	Yes
Notes: 1. Fields between CE1GPC and the end of the program nesting levels were manipulated. Further investigation of your source code is necessary to determine which modifications and reassemblies are required.		

Advanced Program-to-Program Communications (APPC) Macros

Table 13 summarizes the Advanced Program-to-Program Communications (APPC) macro changes for the TPF 4.1 system.

Table 13. Changes to Advanced Program-to-Program Communications (APPC) Macros for the TPF 4.1 System

APPC Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
\$ALLOC	Changed	Yes
\$GETYP	New	Not Applicable
\$POSTR	Changed	Yes
\$RECVW	Changed	Yes
\$SEND	Changed	Yes
CNOSC	New	Not Applicable
TPPCC	Changed	Yes

Systems Network Architecture (SNA) Communication Macros and Statements

Table 14 summarizes the Systems Network Architecture (SNA) communication macro changes for the TPF 4.1 system.

Table 14. Changes to SNA Communication Macros for the TPF 4.1 System

SNA Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SNAKEY	Changed	Yes

Program Test Vehicle (PTV) Macros

Table 15 summarizes the program test vehicle (PTV) macro changes for the TPF 4.1 system.

Table 15. Changes to Program Test Vehicle (PTV) Macros for the TPF 4.1 System

PTV Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
BMGLA	Changed	No
BMGLP	Changed	No
DENDT	No Longer Supported	Not Applicable
EXECT	No Longer Supported	Not Applicable
LOMET	No Longer Supported	Not Applicable
PTVDD	No Longer Supported	Not Applicable
SKIPT	No Longer Supported	Not Applicable
STPMT	No Longer Supported	Not Applicable
STPPT	No Longer Supported	Not Applicable
TRPMT	No Longer Supported	Not Applicable

New, Changed, and Obsolete Data Macros

Table 16 summarizes the data macro changes for the TPF 4.1 system.

Table 16. Changes to Data Macros for the TPF 4.1 System

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
\$INT3C	No Longer Supported	Not Applicable
AM0SG	Changed	No
BC0SA	Changed	Yes
BD0RP	No Longer Supported	Not Applicable
BK0DF	Changed	Yes
BK0RP	Changed	Yes
BK1RP	Changed	Yes
BL0RP	Changed	Yes
CA4CT	Changed	Yes

Table 16. Changes to Data Macros for the TPF 4.1 System (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CCPTB	Changed	Yes
CC0CC	Changed	Yes
CD0BT	Changed	Not Applicable
CGOTD	No Longer Supported	Not Applicable
CHACR	No Longer Supported	Yes
CI1AP	Changed	Yes
CJ3TP	Changed	Yes
CJ6KP	Changed	Not Applicable
CKAKE	No Longer Supported	Not Applicable
CK1KE	Changed	No
CK2KC	Changed	No
CK2SN	Changed	Yes
CK6KE	Changed	No
CK9KC	Changed	Yes
CM8CM	Changed	Yes
CN0CM	Changed	Yes
CONKC	Changed	No
CPTIC	Changed	Yes
CP0SK	Changed	Yes
CRERC	No Longer Supported	Not Applicable
CRTBA	No Longer supported	Not Applicable
CRTBB	No Longer Supported	Not Applicable
CRTBC	No Longer Supported	Yes
CV0CM	Changed	Yes
CW0CC	Changed	Yes
CX#EV	Changed	Yes
CX0CK	Changed	Yes
CX7CW	Changed	Yes
CX8CW	Changed	Yes
CY1KR	Changed	Yes
CY3DR	Changed	Yes
CY5GT	Changed	Yes
CY6TR	Changed	Yes
CZOCP	Changed	No
CZ1CP	Changed	No
CZ1GF	Changed	Yes
CZ1SE	Changed	No
CZ14K	No Longer Supported	Not Applicable

Table 16. Changes to Data Macros for the TPF 4.1 System (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CZ3CP	Changed	No
CZ4CP	Changed	No
DADFQ	Changed	Yes
DBRREC	Changed	Yes
DB0DB	Changed	Yes
DCTBCL	No Longer Supported	Not Applicable
DCTBCR	No Longer Supported	Not Applicable
DCTBDR	No Longer Supported	Not Applicable
DCTBMT	No Longer Supported	Not Applicable
DCTBRD	Changed	Yes
DCTCRW	Changed	No
DCTCTL	Changed	No
DCTCWA	Changed	Some (See Note 1 on page 46.)
DCTDCL	Changed	Yes
DCTDCR	Changed	Yes
DCTDOR	Changed	No
DCTERI	Changed	Yes
DCTFCA	Changed	Yes
DCTIGT	Changed	Yes
DCTIOT	No Longer Supported	Not Applicable
DCTIRB	Changed	No
DCTIST	Changed	No
DCTISV	Changed	Yes
DCTLVL	No Longer Supported	Not Applicable
DCTMAT	Changed	No
DCTMCH	Changed	Yes
DCTMDR	Changed	No
DCTMFS	Changed	Yes
DCTMIO	Changed	Yes
DCTMRB	Changed	Some (See Note 1 on page 46.)
DCTMSG	Changed	No
DCTMUP	Changed	Some (See Note 1 on page 46.)
DCTOLC	No Longer Supported	No
DCTOLD	No Longer Supported	No
DCTOLI	No Longer Supported	No
DCTOLM	No Longer Supported	No

Table 16. Changes to Data Macros for the TPF 4.1 System (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
DCTPDT	Changed	Yes
DCTPFX	Changed	Yes
DCTPST	No Longer Supported	Not Applicable
DCTRIT	Changed	Yes
DCTSON	Changed	Yes
DCTTRC	Changed	Some (See Note 2 on page 46.)
DCTUCL	Changed	Yes
DC0RT	Changed	Yes
DLTEC	Changed	Yes
DLTGC	Changed	No
EB0CN	Changed	No
EB0EB	Changed	Some (See Note 3 on page 46.)
ECBUDS	No Longer Supported	Not Applicable
ERINF	No Longer Supported	Not Applicable
FC0TB	Changed	Yes
GL0BA	Changed	Some (See Note 5 on page 46.)
GL0BB	Changed	Some (See Note 6 on page 46.)
GL0BC	Changed	Some (See Note 7 on page 46.)
GL0BF	Changed	Some (See Note 8 on page 46.)
GL0BP	Changed	Some (See Note 9 on page 46.)
GL0BQ	Changed	Some (See Note 10 on page 46.)
GL0BY	Changed	Some (See Note 11 on page 46.)
GO1GO	Changed	Yes
IB0CT	Changed	No
ICCACB	Changed	Yes
ICCB	Changed	Yes
ICJXWK	Changed	Yes (See Note 13 on page 46.)
ICNOS	New	Not Applicable
ICN0OS	New	Not Applicable
ICSMP	Changed	Not Applicable
ICUSDA	New	Not Applicable

Table 16. Changes to Data Macros for the TPF 4.1 System (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
ICVIPL	New	Not Applicable
ICYCWB	Changed	Yes
ICY7PR	Changed	Yes
IC0CK	Changed	No
IDGREC	Changed	Yes (See Note 14 on page 46.)
IDSCCT	New	Not Applicable
IDSCDR	New	Not Applicable
IDSCFW	Changed	No
IDSCKV	Changed	Not Applicable
IDSCRP	New	Not Applicable
IDSCS1	Changed	No
IDSCS2	Changed	Some (See Note 12 on page 46.)
IDSDBH	New	Not Applicable
IDSDBT	New	Not Applicable
IDSDLR	New	Not Applicable
IDS DMP	New	Not Applicable
IDS DSB	Changed	Yes
IDSEAT	New	Not Applicable
IDSEBC	New	Not Applicable
IDSECT	New	Not Applicable
IDSELD	New	Not Applicable
IDSELT	New	Not Applicable
IDSEMR	New	Not Applicable
IDSEVN	Changed	Yes
IDSFCT	New	Not Applicable
IDSFCZ	New	Not Applicable
IDSFLV	New	Not Applicable
IDSICR	New	Not Applicable
IDSIHR	New	Not Applicable
IDSINQ	New	Not Applicable
IDS IPL	New	Not Applicable
IDS IWC	New	Not Applicable
IDSKPT	New	Not Applicable
IDSLBT	New	Not Applicable
IDSLDT	New	Not Applicable
IDSLVL	New	Not Applicable
IDSMDT	New	Not Applicable

Table 16. Changes to Data Macros for the TPF 4.1 System (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDSPAG	New	Not Applicable
IDSPAT	New	Not Applicable
IDSPBT	New	Not Applicable
IDSPER	New	Not Applicable (See Note 4 on page 46.)
IDSPMR	Changed	Some
IDSPNL	New	Not Applicable
IDSPVR	New	Not Applicable
IDSQED	New	Not Applicable
IDSRCR	Changed	Not Applicable
IDSRHT	New	Not Applicable
IDSSAL	New	Not Applicable
IDSSCT	New	Not Applicable
IDSSNP	Changed	Yes
IDSSPT	New	Not Applicable
IDSSST	Changed	No
IDSSYS	New	Not Applicable
IDSTCB	New	Not Applicable
IDSTPC	New	Not Applicable
IDSTTR	New	Not Applicable
IDSXFC	New	Not Applicable
IDSXTP	New	Not Applicable
IDSZDT	New	Not Applicable
IDY9AR	New	Not Applicable
IEQCE2	New	Not Applicable
IEQCE3	New	Not Applicable
IEQDS	Changed	No
IFC2SC	New	Not Applicable
IFC3UC	New	Not Applicable
IFMLU6	Changed	Yes
IFMSG	New	Not Applicable
IHMLC	New	Not Applicable
IHPR	Changed	Yes
ILUPRO	Changed	No
ILURC	Changed	Yes
IOTBL	New	Not Applicable
IPTBL	New	Not Applicable
IPTCTL	New	Not Applicable
IPTFMT	New	Not Applicable

Table 16. Changes to Data Macros for the TPF 4.1 System (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IPTPD	New	Not Applicable
IPTRF	New	Not Applicable
IRDICB	Changed	No
ISCB	New	Not Applicable
ISDDCB	Changed	Yes
ISEGCT	New	Not Applicable
ISFDT	New	Not Applicable
ISIDE	New	Not Applicable
ISNOTB	Changed	Yes
ISRTBK	Changed	Yes
ISTPCB	Changed	Yes
ISV0SV	New	Not Applicable
IS0ST	Changed	No
ITDVRT	New	Not Applicable
ITGDT	New	Not Applicable
ITGPRT	New	Not Applicable
ITIOB	No Longer Supported	Not Applicable
ITPPC	Changed	Yes
ITSTB	Changed	No
ITSWB	New	Not Applicable
ITUUTL	New	Not Applicable
IUSAT	Changed	Yes
IWABLK	New	Not Applicable
IWBL	Changed	Yes
IXPSV	New	Not Applicable
LDCRL	Changed	Yes
LDEVBK	Changed	No
LK4KC	Changed	Yes
LK5KC	Changed	No
LK6KC	Changed	No
MA0TR	No Longer Supported	Not Applicable
MC0MC	Changed	Yes
MK0CK	Changed	No
MRLNQ	Changed	Yes
MS0AT	Changed	No
MS0UT	Changed	Yes
NA0AT	Changed	Yes
NC0CB	Changed	Yes

Table 16. Changes to Data Macros for the TPF 4.1 System (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
NN1RR	No Longer Supported	Not Applicable
OLDTBL	No Longer Supported	No
OL10L	No Longer Supported	No
PI1DT	Changed	Yes
PP0SG	No Longer Supported	Not Applicable
RC0PL	Changed	No
RC1IT	Changed	No
RR0RT	Changed	Yes
RTTFLM	No Longer Supported	Not Applicable
RT0RT	No Longer Supported	Not Applicable
RV1VT	Changed	Yes
RV2VT	Changed	Yes
SA0AT	Changed	Yes
SC0TM	Changed	No
SDFPF	Changed	No
SD0AT	No Longer Supported	Not Applicable
SE0MS	Changed	Yes
SI1CT	No Longer Supported	Not Applicable
SI2CT	No Longer Supported	Not Applicable
SI3CT	Changed	Yes
SI4CT	Changed	Yes
SLSTL	Changed	Yes
SN0CT	Changed	Yes
SP0KY	Changed	Yes
SP0PA	Changed	Yes
SR0RT	Changed	Yes
STDHD	Changed	Yes
ST0TB	Changed	Yes
SYCON	Changed	Yes
SYGLB	Changed	Yes
SYSET	Changed	Yes
SYSTG	Changed	No
SYSUG	New	Not Applicable
TC0TS	Changed	No
TPFGLB	Changed	Yes
TPLDR	Changed	Yes
TPPCE	Changed	Yes
TVDSA	Changed	Yes

Table 16. Changes to Data Macros for the TPF 4.1 System (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
TVDSB	Changed	Yes
UA1UA	Changed	Yes
UCNFEQ	New	Not Applicable
UR0IO	Changed	Yes
UR1ST	Changed	Yes
VF0AC	Changed	Yes
WG0TA	Changed	Yes
WO0RK	Changed	No
WTO1C	No Longer Supported	Not Applicable
XS0AA	Changed	No
ZNWTC	No Longer Supported	Not Applicable
Z5OTP	Changed	Yes

Table 16. Changes to Data Macros for the TPF 4.1 System (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
Notes: <ol style="list-style-type: none"> 1. Only CP code needs to be reassembled. 2. Only the CBQ0 segment needs to be reassembled. 3. Fields between CE1GPC and the end of the program nesting levels were manipulated. Further investigation of your source code is necessary to determine which modifications and reassemblies are required. 4. The forward chaining structure at and following PMRHFWD was modified. The starting offset is unchanged, so reassembly would not be required but the two unnamed VL3 fields that follow the first fullword are no longer valid. Any application programs referring to those fields would now be incorrect. 5. Segments that use any of the following fields must be reassembled — @DEBRAC, @DEBRA, @Q05MET, @Q05METF, @Q00RTD, @Q00RTDF, @Q01PMD, @Q01PMDF, @Q02GCV, @Q0WGCVF, @TSTRCC, @TSTRCF, @TSTRDC, @TSTRDF, @TSTR0C, @TSTR0F, @TSTR1C, @TSTR1F, @TSTR4C, @TSTR4F, @TSTR5C, @TSTR5F, @TSTR8C, @TSTR8F, @TST41C, @TSTR9F. 6. Segments that use the @TSTFLD2 field must be reassembled. 7. Segments that use the @TSTFLD0 field must be reassembled. 8. Segments that use any of the following fields must be reassembled — @MSCRALK, @MSCRBLK, @MSCRA, @MSCRB, @MPGMACT, @MPGMCRT, @MAPGMDEL, @MPGMEX, @MPGMLCT, @MPGMRES, @MPGMSTT, @MPIFLK1, @MPIFLK2, @MPIF1, @MPIF2, @TSTSTAT. 9. Segments that use the @TSTFLD1 field must be reassembled. 10. Segments that use the @TSTFLD3 field must be reassembled. 11. Segments that use any of the following fields must be reassembled — @TSTRAC, @TSTRBC, @TSTREC, @TSTRFC, @TSTR2C, @TSTR3C, @TST46C, @TST47C. 12. Reassembly is required only when the software is sensitive to the value of the CS2MSMAX equate. 13. If the TPF 3.1 system and TPF 4.1 system coexist in your organization, the CYGN and CYEP programs must be modified to look at the correct format passed in the SIPCC macro. 14. In the TPF 4.1 system, the final assembled length of the IDGREC data macro is 4 bytes longer than in the TPF 3.1 system for the following reasons: <ul style="list-style-type: none"> • In the TPF 4.1 system, the spare area following IDGUSED is 63 bytes rather than 59 bytes, as found in the TPF 3.1 system. • The user area at IDGUSER is defined as 2 doublewords, which causes the field to be rounded up to the next doubleword boundary. 		

New, Changed, and Obsolete General Use C Language Support Functions

Table 17 summarizes general use C language support function changes for the TPF 4.1 system. *General use* means these functions are available for your use.

Table 17. Changes to General Use C Language Support Functions for the TPF 4.1 System

Function	New, Changed, or No Longer Supported?	Header File	Do You Need to Recompile?
attac_ext	New	tpfapi.h	Not Applicable
calloc	New	tpflink.h	Not Applicable

Table 17. Changes to General Use C Language Support Functions for the TPF 4.1 System (continued)

Function	New, Changed, or No Longer Supported?	Header File	Do You Need to Recompile?
cebic_	No Longer Supported	c000	Not Applicable
cebic_goto_bss	New	sysapi.h	Not Applicable
cebic_goto_dbi	New	sysapi.h	Not Applicable
cebic_goto_ssu	New	sysapi.h	Not Applicable
cebic_restore	New	sysapi.h	Not Applicable
cebic_save	New	sysapi.h	Not Applicable
cincf	Changed	c\$cincf.h	No
cmaccp	New	tpfmap.h	Not Applicable
cmallc	New	tpfmap.h	Not Applicable
cmcfm	New	tpfmap.h	Not Applicable
cmcfmd	New	tpfmap.h	Not Applicable
cmdeal	New	tpfmap.h	Not Applicable
cmecs	New	tpfmap.h	Not Applicable
cmemn	New	tpfmap.h	Not Applicable
cmepln	New	tpfmap.h	Not Applicable
cmesl	New	tpfmap.h	Not Applicable
cmflus	New	tpfmap.h	Not Applicable
cminit	New	tpfmap.h	Not Applicable
cmptr	New	tpfmap.h	Not Applicable
cmrcv	New	tpfmap.h	Not Applicable
cmrts	New	tpfmap.h	Not Applicable
cmsdt	New	tpfmap.h	Not Applicable
cmsed	New	tpfmap.h	Not Applicable
cmsend	New	tpfmap.h	Not Applicable
cmserr	New	tpfmap.h	Not Applicable
cmsmn	New	tpfmap.h	Not Applicable
cmspln	New	tpfmap.h	Not Applicable
cmsptr	New	tpfmap.h	Not Applicable
cmsrc	New	tpfmap.h	Not Applicable
cmssl	New	tpfmap.h	Not Applicable
cmsst	New	tpfmap.h	Not Applicable
cmstpn	New	tpfmap.h	Not Applicable
cmtrts	New	tpfmap.h	Not Applicable
cretc	Changed	tpfapi.h	No
cretc_level	New	tpfapi.h	Not Applicable
crosc_entr	New	sysapi.h	Not Applicable
csonc	New	tpflink.h	Not Applicable
detac_ext	New	tpfapi.h	Not Applicable
evinc	New	tpfapi.h	Not Applicable

Table 17. Changes to General Use C Language Support Functions for the TPF 4.1 System (continued)

Function	New, Changed, or No Longer Supported?	Header File	Do You Need to Recompile?
evnqc	New	tpfapi.h	Not Applicable
evntc	New	tpfapi.h	Not Applicable
evnwc	New	tpfapi.h	Not Applicable
free	New	tpflink.h	Not Applicable
getcc	Changed	tpfapi.h	No
getfc	Changed	tpfio.h	Yes
getpc	New	tpflink.h	Not Applicable
inqrc	Changed	Not Applicable	Yes
keyrc	New	tpflink.h	Not Applicable
malloc	New	tpflink.h	Not Applicable
maskc	New	tpflink.h	Not Applicable
modcc	No Longer Supported	tpflink.h	Not Applicable
pausc	New	tpflink.h	Not Applicable
postc	New	tpfapi.h	Not Applicable
progc	New	tpflink.h	Not Applicable
realloc	New	tpflink.h	Not Applicable
relpc	New	tpflink.h	Not Applicable
ridcc	New	tpflink.h	Not Applicable
rvtcc	New	tpflink.h	Not Applicable
serrc_op_ext	New	tpfapi.h	Not Applicable
serrc_op_slc	New	tpfapi.h	Not Applicable
sipcc	New	tpflink.h	Not Applicable
sonic	New	tpflink.h	Not Applicable
systc	New	tpflink.h, c\$systc.h, c\$sysug.h	Not Applicable
tdspc_q	New	tpftape.h	Not Applicable
tppc_allocate	Changed	tppc.h	Yes
tppc_get_attributes	Changed	tppc.h	Yes
tppc_get_type	New	tppc.h	Not Applicable
tppc_post_on_receipt	Changed	tppc.h	Yes
tppc_receive	Changed	tppc.h	Yes
tppc_send_data	Changed	tppc.h	Yes
wtopc	Changed	Not Applicable	No

New, Changed, and Obsolete General Use C Language Header Files

Table 18 summarizes general use C language header file changes for the TPF 4.1 system. *General use* means these header files are available for your use.

Table 18. Changes to General Use C Language Header Files for the TPF 4.1 System

Header File	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
c\$cinfc.h	Changed	No
c\$cj6kp.h	New	Not Applicable
c\$ck1ke.h	New	Not Applicable
c\$ck2sn.h	New	Not Applicable
c\$cx0ck.h	New	Not Applicable
c\$czx1.h	New	Not Applicable
c\$czx2.h	New	Not Applicable
c\$dadfq.h	New	Not Applicable
c\$dctist.h	New	Not Applicable
c\$eb0eb.h	Changed	Some (See Note 1 on page 51.)
c\$fbdl.h	New	Not Applicable
c\$fbdl2.h	New	Not Applicable
c\$cfct.h	New	Not Applicable
c\$ftd0.h	New	Not Applicable
c\$ftdl.h	New	Not Applicable
c\$iccacb.h	Changed	Yes
c\$iccb.h	Changed	Yes
c\$ichutl.h	New	Not Applicable
c\$icolr.h	New	Not Applicable
c\$icusda.h	New	Not Applicable
c\$idcutl.h	New	Not Applicable
c\$iddm.h	Changed	No
c\$idir.h	Changed	Yes
c\$idsalo.h	New	Not Applicable
c\$idscdr.h	New	Not Applicable
c\$idseat.h	New	Not Applicable
c\$idsecr.h	New	Not Applicable
c\$idseld.h	New	Not Applicable
c\$idselt.h	New	Not Applicable
c\$idselv.h	New	Not Applicable
c\$idsemr.h	New	Not Applicable
c\$idsepd.h	New	Not Applicable
c\$idserd.h	New	Not Applicable
c\$idsicr.h	New	Not Applicable

Table 18. Changes to General Use C Language Header Files for the TPF 4.1 System (continued)

Header File	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
c\$idsihr.h	New	Not Applicable
c\$idsinq.h	New	Not Applicable
c\$idsipl.h	New	Not Applicable
c\$idskpt.h	New	Not Applicable
c\$idsldt.h	New	Not Applicable
c\$idslsd.h	New	Not Applicable
c\$idsold.h	New	Not Applicable
c\$idspat.h	New	Not Applicable
c\$idspvr.h	New	Not Applicable
c\$idssal.h	New	Not Applicable
c\$idsxtp.h	New	Not Applicable
c\$iedctl.h	New	Not Applicable
c\$ifc2.h	New	Not Applicable
c\$ifc3.h	New	Not Applicable
c\$ifc4.h	New	Not Applicable
c\$ifdo.h	Changed	Yes
c\$iptbl.h	New	Not Applicable
c\$irdicb.h	Changed	No
c\$isddcb.h	Changed	Yes
c\$isql.h	Changed	Yes
c\$isrtbk.h	New	Not Applicable
c\$istpcb.h	Changed	Yes
c\$ituutl.h	New	Not Applicable
c\$kpptat.h	New	Not Applicable
c\$mk0ck.h	New	Not Applicable
c\$ms0at.h	New	Not Applicable
c\$ms0ut.h	Changed	Yes
c\$rc0pl.h	Changed	No
c\$rvlvt.h	Changed	Yes
c\$stdhd.h	New	Not Applicable
c\$syseq.h	Changed	Yes
c\$systc.h	New	Not Applicable
c\$tpldr.h	New	Not Applicable
c\$ucnfeq.h	New	Not Applicable
reusable.h	New	Not Applicable
stdlib.h	Changed	No
sysapi.h	New	Not Applicable
tpfapi.h	Changed	No

Table 18. Changes to General Use C Language Header Files for the TPF 4.1 System (continued)

Header File	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
tpfar.h	Changed	Yes
tpfeq.h	Changed	No
tpfio.h	Changed	No
tpflink.h	Changed	No
tpfmap.h	New	Not Applicable
tpfmcsll.h	New	Not Applicable
tpfparft.h	Changed	No
tpfparse.h	Changed	Yes
tpftape.h	Changed	No
tpftuu.h	New	Not Applicable
tppc.h	Changed	Yes
zimageq.h	New	Not Applicable
zimagmsg.h	New	Not Applicable
Notes: 1. Fields between CE1GPC and the end of the program nesting levels were manipulated. Further investigation of your source code is necessary to determine which modifications and reassemblies are required.		

New, Changed, and Obsolete User Exits

Table 19 and Table 20 on page 53 identify the control program and ECB user exits for the TPF 4.1 system that are new, changed, and no longer supported.

Control Program (CP) User Exits

Table 19 summarizes control program (CP) user exit changes.

Table 19. Changes to Control Program (CP) User Exits for the TPF 4.1 System

Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CPSL(CCCPSE)	UCCDOT	New	User exit for the dump override table.
CPER(CCCPSE)	UCCPER	New	User exit for changing program event recording (PER) interrupt data.
CLHV(CCSTOR)	UCCGBE	New	User exit for getting storage blocks (that are not ECBs or common blocks) with an ECB.
CLHV(CCSTOR)	UCCGBK	Changed	This use exit now gets storage blocks without an ECB.
CLHV(CCSTOR)	UCCGCB	New	User exit for getting common blocks.
CLHV(CCSTOR)	UCCGSB	New	User exit for getting system work blocks (SWBs).
CLHV(CCSTOR)	UCCRBE	New	User exit for releasing storage blocks (that are not ECBs or common blocks) with an ECB.

Table 19. Changes to Control Program (CP) User Exits for the TPF 4.1 System (continued)

Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CLHV(CCSTOR)	UCCRBK	Changed	This user exit now releases storage blocks without an ECB.
CLHV(CCSTOR)	UCCRCB	New	User exit for releasing common blocks.
CLHV(CCSTOR)	UCCRSB	New	User exit for releasing system work blocks (SWBs).
CEDM(CCMCDC)	UCCSVC	New	User exit for indexed SVC decoder.
CT24(CCCTIN)	CT24	Changed	IBM TPFDF initialization. CT24 is no longer a user exit and is now activated by CTIN. Before this release, CT24 was activated in CT00. The code for IBM TPFDF support is incorporated into the TPF 4.1 system.
CT25(CCCTIN)	CT25	Changed	CT25 now contains the imbedded USATC macro, which will generate an in-line USAT. Additional fields can now be specified such as the associated CINFC label and dump keyword.
CT26(CCCTIN)	CT26	Changed	CT26 was changed to process the new USAT fields. CT26 also aligns each user table on 4 KB boundaries, allowing you to key protect your tables.
CT99(CCCTIN)	CT99	New	User exit for initializing/key protecting user tables and initializing user CINFC labels.
	UCCCFE	No Longer Supported	Replaced by UCCENTD, UCCENTR, and UCCENTN.
CCEB(CCNUCL)	UCCCFB	Changed	Called only at BACKC macro entry.
	UCCCOR	No Longer Supported	Replaced by UCCCREB.
CCEB(CCNUCL)	UCCCREB	New	Core resident Enter/Back EXIT exit point, replaces UCCCOR.
CCEB(CCNUCL)	UCCFREB	New	File resident Enter/Back EXIT exit point, which replaces the SVC macro return point.
CCEB(CCNUCL)	UCCENTD	New	ENTDC macro entry point, which replaces the CFE and ENTDC SVC entry point.
CCEB(CCNUCL)	UCCENTN	New	ENTNC macro entry point, which replaces CFE and ENTNC SVC entry point.
CCEB(CCNUCL)	UCCENTR	New	ENTRC macro entry point, which replaces the CFE and ENTRC SVC entry point.
CPSE(CCCPSE)	UCCSRX	New	System error EXIT exit point.
CPSM(CCCPSE)	UCCSPX	New	SNAPC error EXIT exit point.
CPSF(CCCPSF)	UCCCAT	New	Catastrophic recovery, which is provided to give you the opportunity to log critical records to tape.
CTME(CCNUCL)	UCCCP TI	New	Control program timer interrupt exit point.
CCEB(CCNUCL)	UCCEXI	Changed	This exit point was moved to just before the ECB release code.

Table 19. Changes to Control Program (CP) User Exits for the TPF 4.1 System (continued)

Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CICR(CCNUCL) CHIM(CCNUCL) CCE4(CCIISC)	UCCCMCP	New	Create macro control point for the CREMC, CREEC, CREDC, and CREXC macros. Create macro control point for the CRETC macro. Create macro control point for the SWISC macro.
CHSZ(CCNUCL)	UCCCMXF	New	Control transfer macro exit point.
CHSZ(CCNUCL)	UCCCMPI	New	Create macro post interrupt exit point.
CL02(CCLANG)	UCCCSER	New	C static/stack exception handler return exit.
CL01(CCLANG)	UCCCFD	New	C library function call exit.
CL01(CCLANG)	UCCCFR	New	C library function return exit.
CUSR(CCUEXT)	UCCDFFC	New	IBM TPFDF fast-link call user exit.
CUSR(CCUEXT)	UCCDFFR	New	IBM TPFDF fast-link return user exit.

ECB User Exits

Table 20 summarizes ECB user exit changes.

Table 20. Changes to ECB User Exits for the TPF 4.1 System

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Changes
Clock Restart	CDTC	GCALX	Changed	Clock global update exit. Application I-stream global addresses were relocated. (GCALX is a copy member.)
Clock Restart	GLBL	GCLKX	Changed	Clock global update exit. Non-main global addresses were relocated. (GCLKX is a copy member.)
Clock Restart	CDTD	GDATX	Changed	Clock global update exit. Non-main global addresses were relocated. (GDATX is a copy member.)
Database Reorganization	BDBF	UBDB	New	User exit to process user-unique database reorganization initialization procedures.
E-Type Loader Display	CLDU CLDV CLDW CLE2 CLE3	UELG	New	User exit to display additional information using the E-type loader display function.
E-Type Loader Library Function	CELE CLDJ	UELE	New	User exit to activate programs that are not entered through the normal Enter/Back process.

Table 20. Changes to ECB User Exits for the TPF 4.1 System (continued)

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Changes
E-Type Loader Loadset History	CLDG CLDH CLDO COLA COLE COLG COLJ COLM COL7	UELL	New	User exit to track the changes made to the status and contents of loadsets.
E-Type Loader Message Restriction	CELA	UELD	New	User exit to maintain control over who is allowed to enter the ZOLDR commands.
E-Type Loader Offline Processing	COLR	UELR	New	User exit to maintain control over which programs are loaded using the E-type loader.
E-Type Loader Selective Activate	CELF CEL1 CEL2 COA4 COLC	UELF UELH UELN UELU UELW UELX UEL1	New	User exits to maintain control over which ECBs can enter the programs contained in specific loadsets.
FACE Table	CT00	CT25	Changed	Three user exits (FHD, FSC, and FSP) were added to provide access to the file address compute program (FACE) table header, split chain header, and split.
Program History	CIL7 CIPY CLDJ CLEJ COLC COLK COLO	UELM	New	User exit to track changes made to the status and contents of programs.

Table 20. Changes to ECB User Exits for the TPF 4.1 System (continued)

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Changes
Virtual Routine Selection Exit	CSJC	CSJV	Changed	<p>EBW060 SLU resource identifier (RID) is no longer necessary in the TPF 4.1 system.</p> <p>EBW064 SLU RUT1 is EBW028 in the TPF 4.1 system.</p> <p>EBW068 SLU RUT2 is no longer necessary in the TPF 4.1 system.</p> <p>EBW072 SAT has no changes in the TPF 4.1 system.</p> <p>EBW076 through EBW104 have no changes in the TPF 4.1 system.</p>
Not Applicable	COSK COSM COTI COTR COTM COTS COTT	UXTD	Changed	Updated to activate for automatic tape mounting.
System Error	CPSE	CPSU	New	Dump data user exit. User exit to view dump data online.
System Error	UPER	PER	New	Provides a means of changing the output destination for data captured by a program event recording (PER) interrupt and permits changes in the amount and format of the interrupt data displayed.
TPFDF Recoup	BKA0	UBKA	No Longer Supported	The code is incorporated into BKA0.
TPFDF Recoup	BRPA	UBRP	Changed	No longer a user exit. The code for IBM TPFDF Recoup is incorporated into the TPF 4.1 system.
TPFDF Recoup	BKB0 BRSH BKA0	UBRS	Changed	No longer a user exit. The code for IBM TPFDF Recoup is incorporated into the TPF 4.1 system.
TPFDF Recoup	BWRT	UBWR	Changed	No longer a user exit. The code for IBM TPFDF Recoup is incorporated into the TPF 4.1 system.
Not Applicable	CTKS	UCTK	Changed	No longer a user exit. The code for the IBM TPFDF Recoup utility is incorporated into the TPF 4.1 system.
Not Applicable	OLDO	UOLD	No Longer Supported	E-type loader user exit.
Session Status Awareness	CSCQ	CSXD	Changed	<p>Parameter list was modified.</p> <p>ISHLRC is now a reserved field.</p>
User-Defined Input Device	CEL6	UELC	New	User exit to perform open, read, or close operations on a user-defined input device.

Table 20. Changes to ECB User Exits for the TPF 4.1 System (continued)

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Changes
Virtual Reader Support	CEL6	UEL6	New	User exit to perform open, read, or close operations on a virtual reader input device.
LU 6.2 Session Activation	CMW0	CSXA	Changed	The information passed to the exit has changed.
LU 6.2 Conversation Allocation	CMW0	CSXB	Changed	The information passed to the exit has changed.
LU 6.2 Session Termination	CMW0	CSXC	Changed	The information passed to the exit has changed.

New, Changed, and Obsolete Control Program Interface (CINFC) Tags

Table 21 summarizes control program interface (CINFC) tag changes for the TPF 4.1 system. The information in this table is sorted numerically by the equate value.

Table 21. Changes to CINFC Tags for the TPF 4.1 System

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMIPC	06	No Longer Supported
CM1LST	13	No Longer Supported
CMMCNT	18	No Longer Supported
CMMTPF	18	New
CMPST	30, 128	No Longer Supported
CMMSECNT	30	New
CMMSWIS	38	New
CMMCQY	41	No Longer Supported
CMMSST	41	New
CMMCTSD	51, 128	Changed (old value)
CMPBT	51	New
CMMEED	52	No Longer Supported
CMMGLBL	52	New
CMMCUH	57, 128	No Longer Supported
CMMEVNP	62	Changed (old value)
CMMDFSW	62	New
CMMVCW	66	New
CMMCTL	67	No Longer Supported
CMMBVT	67	No Longer Supported
CMMFRA	70	No Longer Supported
CMPAUS	70	New
CMPOL	76	No Longer Supported

Table 21. Changes to CINFC Tags for the TPF 4.1 System (continued)

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMIPTE	76	New
CMMCLV	89	No Longer Supported
CMMLVL	89	New
CM1PST	90, 128	No Longer Supported
CMMBBT	90	Changed (new value)
CMMBBT	91	Changed (old value)
CMMDOBT	91	New
CMMCCT	92	Changed (old value)
CMMCCT	92, 4	Changed (new value)
CMMOLD	96, 128	No Longer Supported
CMMLBT	97	New
CMMEVNP	105	Changed (new value)
CMMICDF	106	New
CMMSF0	109	No Longer Supported
CMMFLNM	109	New
CMMSOBTI	110	New
CMMAET	112	Changed (old value)
CMMSDT	112	New
CMMDC1	115	No Longer Supported
CMMPTLB	115	New
CMMTDC	117	No Longer Supported
CMMHEAP	117	New
CMMEBLL	118	No Longer Supported
CMMSOBTU	118	New
CMMCLST	128	Changed
CMMEACP	131	No Longer Supported
CMMCVRA	131	New
CMMEBC	134	New
CMMVFCDP	142	No Longer Supported
CMMFLDT	142	New
CMMDFL	143, 128	Changed (old value)
CMMPAT	143, 128	New
CMMZKEY	144	No Longer Supported
CMMPHASH	144, 128	New
CMMZSTB	145	No Longer Supported
CMMIBMTB	145	New
CMMZCHQ	146	No Longer Supported
CMMUSTRTB	146	New
CMMZCQSW	147	No Longer Supported

Table 21. Changes to CINFC Tags for the TPF 4.1 System (continued)

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMFLITB	147	New
CMMZCQID	148	No Longer Supported
CMMSMDT	148	New
CMPXEXP	149	No Longer Supported
CMMDCRA	151	Changed
CMMMDSW	166	No Longer Supported
CMMTTR	166	New
CMMRELFAC	168, 128	No Longer Supported
CMMDFL	168, 128	Changed (new value)
CMPTVAD	170	No Longer Supported
CMMTTE	170	New
CMMSFT	185	Changed
CMMIET	186	New
CMMKT1	189	No Longer Supported
CMMCTSD	189, 128	Changed (new value)
CMMKT2	190	No Longer Supported
CMMIDT	190	New
CMMANS	197	Changed
CMMLSEPT	198	No Longer Supported
CMMPERCA	198	New
CMMCOKX	199	No Longer Supported
CMMIDFT	199	New
CMMRCST	206	Changed
CMAAET	207	Changed (new value)
CMMK3B	211	No Longer Supported
CMMRTT	213	Changed
CMMRIDC	229	No Longer Supported
CMMTPIC	232	Changed
CMMPIU	234	No Longer Supported
CMMPIUC	234	New
CMMVFAS	241	No Longer Supported
CMMSNF	241	New
CMMFCTB	245	No Longer Supported
CMMFCTV	245	New
CMMSNAL	248	New
CMMRTTB	249	No Longer Supported
CMMGLBTB	271	New
CMMOPK	272, 128	No Longer Supported
CMMSMT	273	Changed

Table 21. Changes to CINFC Tags for the TPF 4.1 System (continued)

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMTTRA	274	New
CMMQTIME	275	New
CMMCTDAT	276	New
CMMLINT	277	New
CMMTGDT	278	New
CMMCRP24	280	New
CMMCRP31	281	New
CMMXPAT	282	New
CMMACNUM	283	New
CMMEAT	284	New
CMMENTRT	285	New
CMMSELMP	286, 128	New
CMMELPOL	287	New
CMMEHDR	288, 128	New
CMMWRT	289, 128	New
CMMCLIBT	290	New
CMMAIM	300, 128	New
CMMUSR1	301	New
CMMUSR2	302, 128	New

New, Changed, and Obsolete Configuration Constant (CONKC) Tags

Table 22 summarizes configuration constant (CONKC) tag changes for the TPF 4.1 system.

Table 22. Changes to CONKC Tags for the TPF 4.1 System

CONKC Tag	New, Changed, or No Longer Supported?
@00FLB	No Longer Supported
@01PCDT	No Longer Supported
@02SIPC0	No Longer Supported
@02SIPC1	No Longer Supported
@02IPC0C	No Longer Supported
@02IPC1C	No Longer Supported
@05TNT	New
@06ICR	New

New, Changed, and Obsolete System Equates (SYSEQ)

This section discusses system equate changes.

SYSEQ Tags

Table 23 summarizes system equate (SYSEQ) changes for the TPF 4.1 system that are not configuration dependent.

Table 23. Changes to SYSEQ Tags for the TPF 4.1 System

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?	Description of Change
#PTCHRT	X'17'	New	Not Applicable
#PTVAKP	X'18'	New	Not Applicable
#RDLR	X'1B'	New	Not Applicable
#@SSTPR	X'1C'	New	Not Applicable
#PSVN	X'09'	New	Not Applicable
#ICHUTL0	27	New	ICHUTL for Processor 1 (Capture and Restore).
#ICHUTL1	28	New	ICHUTL for Processor 2 (Capture and Restore).
#ICHUTL2	29	New	ICHUTL for Processor 3 (Capture and Restore).
#ICHUTL3	30	New	ICHUTL for Processor 4 (Capture and Restore).
#ICHUTL4	31	New	ICHUTL for Processor 5 (Capture and Restore).
#ICHUTL5	32	New	ICHUTL for Processor 6 (Capture and Restore).
#ICHUTL6	33	New	ICHUTL for Processor 7 (Capture and Restore).
#ICHUTL7	34	New	ICHUTL for Processor 8 (Capture and Restore).
#IDCUTL	43	New	Channel Usage Table (Table Update).
#DDCT	44	New	Disk Device Control Table (Capture and Restore). (See Note 62.)
#BXP0	45	New	Working Keypoint for Processor 1 (Capture and Restore). (See Note 62.)
#BXP1	46	New	Working Keypoint for Processor 2 (Capture and Restore). (See Note 62.)
#BXP2	47	New	Working Keypoint for Processor 3 (Capture and Restore). (See Note 62.)
#BXP3	48	New	Working Keypoint for Processor 4 (Capture and Restore). (See Note 62.)
#BXP4	49	New	Working Keypoint for Processor 5 (Capture and Restore). (See Note 62.)
#BXP5	50	New	Working Keypoint for Processor 6 (Capture and Restore). (See Note 62.)
#BXP6	51	New	Working Keypoint for Processor 7 (Capture and Restore). (See Note 62.)
#BXP7	52	New	Working Keypoint for Processor 8 (Capture and Restore). (See Note 62.)

Table 23. Changes to SYSEQ Tags for the TPF 4.1 System (continued)

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?	Description of Change
#RCATSTP	53	New	Working RCAT Stop Table (Moved from the CRNN Program).
#@SSTMR	55	New	SST Master Record.
#CCKP	56	New	3705 Keypoint Record.
#IFMSG	75	New	Command Table; Update Record.
#TGDRTORD	93	New	Tape Group Definition Table (Processor 0).
*	94	New	Tape Group Definition Table (Processor 1).
*	95	New	Tape Group Definition Table (Processor 2).
*	96	New	Tape Group Definition Table (Processor 3).
*	97	New	Tape Group Definition Table (Processor 4).
*	98	New	Tape Group Definition Table (Processor 5).
*	99	New	Tape Group Definition Table (Processor 6).
*	100	New	Tape Group Definition Table (Processor 7).
*	101	New	General File Control Record (Processor 0).
*	102	New	General File Control Record (Processor 1).
*	103	New	General File Control Record (Processor 2).
*	104	New	General File Control Record (Processor 3).
*	105	New	General File Control Record (Processor 4).
*	106	New	General File Control Record (Processor 5).
*	107	New	General File Control Record (Processor 6).
*	108	New	General File Control Record (Processor 7).
#BGNSZ	X'0'	Changed	Not Applicable.
#PRTV0	X'08'	New	Not Applicable.

Table 23. Changes to SYSEQ Tags for the TPF 4.1 System (continued)

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?	Description of Change
Notes: <ul style="list-style-type: none"> In this table, ICHUTL refers to the channel usage table. Segments coding the IMMED parameter must be reassembled. Segments coding the FORCE parameter must be reassembled. Only control program (CP) code must be reassembled. Type S support is no longer supported. The MD and CLIST parameters are no longer supported. Fields between CE1GPC and the end of the program nesting levels were manipulated in the TPF 4.1 system. Further investigation of your source code is necessary to determine which modifications and reassemblies are required. Only the CBQ0 segment must be reassembled. Segments that use any of these fields must be reassembled — @DEBRAC, @DEBRAf, @Q05MET, @Q05METF, @Q00RTD, @Q00RTDF, @Q01PMD, @Q02GCF, @Q02GCVF, atsign.TSTRCC, @TSTRCF, @TSTRDC, @TSTRDF, @TSTR0C, @TSTR0F, @TSTR1C, @TSTR1F, @TSTR4C @TSTR4F, @TSTR5C, @TSTR5F, @TSTR8C @TSTR8F, @TSTR9C, @TSTR9f. Segments that use the @TSTFLD2 field must be reassembled. Segments that use the @TSTFLD0 field must be reassembled. Segments that use any of these fields must be reassembled — @MSCFALK, @MSCRBLK, @MSCRA, @MSCRB, @MPGMACT, @MPGMCRT, @MPGMDEL, @MPGMEX, @MPGMLCT, @MPGMRES, @MPGMSTT, @MPIFLK1, @MPIFLK2, @MPIF1, @MPIF2, @TSTSTAT. Segments that use the @TSTFLD1 field must be reassembled. Segments that use the @TSTFLD3 field must be reassembled. Segments that use any of these fields must be reassembled — @TSTRAC, @TSTRBC, @TSTREC, @TSTRFC, @TSTR2C, @TSTR3C, @TSTR6C, @TSTR7C. Reassembly is required only when your application programs are sensitive to the value of the CS2MSMAX equate. The forward chaining structure at and following PMRHFWD was modified in the TPF 4.1 system. The starting offset is unchanged, so reassembly is not required, but the two unnamed VL3 fields that follow the first fullword are no longer valid. Any application program referring to those fields is no longer correct. You must initialize this SYSEQ tag (Capture and Restore keypoint record) by entering ZFCAP CLEAR ALL or ZFCAP CLEAR. See "Learning About the Changes in System Support Services" on page 277 and the <i>TPF Database Reference</i> for more information about the Capture and Restore package. 			

New, Changed, and Obsolete Commands

Table 24 on page 63 summarizes command changes to the TPF 4.1 system.

Attention: Changes to commands can impact any automation programs you are using in your complex.

See *TPF Operations* for a complete description of all commands.

Table 24. Changes to Commands for the TPF 4.1 System

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZACLV	Changed	<p>Alter Central Processing Unit (CPU) Loop and Create Macro Control Levels.</p> <p>System shutdown values are now specified in terms of frames, common blocks, ECBs, IOBs, and SWBs (128, 381, and 1055 byte blocks). Positional parameters are no longer supported.</p> <p>See “Modifying and Displaying CPU Loop and Create Macro Control Levels” on page 272 for more information.</p>
ZACOR	Changed	<p>Alter Core.</p> <p>You can verify the data you want to alter by specifying up to 16 bytes of data that must match the data at the specified address. If the data does not match, no alteration is done.</p> <p>The Help function was added.</p>
ZACRS	No Changes	Alter Computer Room Agent Set (CRAS) Console Status.
ZADCA	Changed	<p>Alter Dump Tag.</p> <p>You can verify the data you want to alter by specifying up to 16 bytes of data that must match the data at the specified address. If the data does not match, no alteration is done.</p>
ZAFIL	Changed	<p>Alter File.</p> <p>Validation and help facilities were added, and the input format of the message was changed. Also, 4-byte MCHR support was removed; 7-byte MCHR should be used in its place. A new type, GF, is available to designate that the input address is a general file relative record number.</p>
ZAGFL	No Changes	Alter General File Label Track.
ZALCT	No Changes	Alter Line Path Status.
ZALMT	No Changes	Acquire Network Extension Facility (NEF) Long Message Transmitter (LMT) Queue Ownership.
ZAMAP	No Changes	Online Map File Load and Update.
ZAMOD	No Changes	Alter Module Status.
ZAPAT	New	<p>Alter Program Allocation Table (PAT).</p> <p>Alter an entry in the core copy, file copy, or both copies of the PAT. Some changes take effect immediately; others take effect when you perform an initial program load (IPL) of the system. If you attempt to change an entry associated with a transfer vector, the entry associated with the parent program is changed instead. See “Modifying and Displaying the Program Allocation Table” on page 268 for more information.</p> <p>Note: You can only change the PAT on the image that is currently active.</p>

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZAPGM	Changed	<p>Alter Program.</p> <p>The TYPE parameter is now called the COPY parameter. Use the COPY parameter to alter the core copy, file copy, or both copies of a program. You can update the control program and restart area. You can verify the data you want to alter by specifying up to 16 bytes of data that must match the data at the specified address. If the data does not match, no alteration is done. You can now modify IPLA and IPLB with this command.</p> <p>You can now specify the version code of the real-time program that you want to alter.</p> <p>You can use the new LOADSET parameter to specify the name of the loadset that contains the program to alter. Note: You can only change a program on the image that is currently active.</p> <p>The Help function was added.</p>
ZAREC	Changed	<p>Alter a Fixed File Record or a Pool Record.</p> <p>The input format of the message was changed significantly. You can verify the data you want to alter by specifying up to 32 bytes of data that must match the data at the specified address. If the data does not match, no alteration is done.</p> <p>The Help function was added.</p>
ZASER	Changed	<p>Alter System Error Options</p> <p>Changed — Several options were changed or added. See “Options that Changed for the ZASER Command” on page 263 for more information.</p>
ZASPT	No Longer Supported	<p>Alter Slow Poll Interval.</p> <p>Support for low-speed lines was dropped.</p>
ZATEC	No Longer Supported	Display and Clear Tape Error Counters.
ZATIM	No Changes	Add Sysplex Timer Information to Keypoint I.
ZATIM	No Changes	Alter Time.
ZATME	No Changes	Reply to Date Change Message.
ZAURS	Changed	<p>Activate Patch Routine, Activate Print Routine, Unit Record Message Filter.</p> <p>The ARDR and DPTR parameters are no longer supported because they were associated with the automated patch routine (ARD). The ARD is no longer supported.</p>
ZAUTH	No Changes	Display/Alter Terminal Log On Authority.
ZAVSN	No Changes	Alter Volume Serial Number (VSN).
ZBOLT	No Changes	Start a Binary Synchronous Communication (BSC) Online Test.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZBUFC	No Changes	Display Cache Message Formats.
ZBUFC ALLOCATE	No Changes	Display Cache Allocation Settings, Implement Pending Allocation Changes, Specify Cache and Lock Allocation.
ZBUFC ENABLE	No Changes	Enable Caching Functions.
ZBUFC FILE	No Changes	Destage Modified Data from Cache to Direct Access Storage (DASD).
ZBUFC MAP	No Changes	Map Record Cache Subsystem (RCS) Subsystem ID (SSID)/Device Addresses.
ZBUFC PINNED	No Changes	Discard Pinned Data, Display Pinned Data Report.
ZBUFC SETCACHE	No Changes	Set Cache Operating Modes.
ZBUFC STATUS	No Changes	Display Caching Status.
ZBUFC THRESHLD	No Changes	Display or Change Input/Output (I/O) Queue Threshold Value.
ZCMKH	No Longer Supported	Machine Check Utility Message. There is no replacement. The TPF 4.1 system runs disabled (QUIET) for system recoveries.
ZCNIS	No Changes	Change Instruction Stream Parameters.
ZCNTM	No Changes	Start Macro Count Trace.
ZCSON	Changed	Convert MCHR to file address reference format (FARF) file address. The K parameter was dropped.
ZCTKA Alter	New	Alter Storage Allocation Values. Alter storage allocation values that are initially defined during the system initialization program (SIP) and moved to Keypoint A. Use to alter the timeout value used to monitor stalled tape module queues. Note: When using this command you may receive CTL-00Cs (especially when working in migration mode) if the values for the blocks are changed indiscriminately. Therefore, you may want to consider restricting the use of this command to system programmers. See “Modifying Storage Allocation Values Online” on page 262 for more information.
ZCTKA Display	New	Display Storage Allocation Values or Tape Queue Timeout Value. Display alter storage allocation values that are initially defined during the system initialization program (SIP) and moved to Keypoint A. Use to display the timeout value used to monitor stalled tape module queues. See “Modifying Storage Allocation Values Online” on page 262 for more information.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZCYCL	No Changes	Cycle Down/Up (Alter System Operating State).
ZDADD	Changed	Display file address reference format (FARF) File Addresses from Record Type and Ordinal Number. The processor, I-stream, and subsystem user (SSU) can be specified.
ZDBRI START	Changed	Start Database Reorganization (DBR) Input Operations. Field sizes for record type specifications were increased to a 12 KB maximum.
ZDBRI RESTART	Changed	Restart Database Reorganization (DBR) Input Operations. Field sizes for record type specifications were increased to a 12 KB maximum.
ZDBRO ABORT	No Changes	Abort Database Reorganization (DBR) Processing.
ZDBRO BYPASS	Changed	Bypass Database Reorganization (DBR) Processing of Record Types.
ZDBRO DISPLAY	Changed	Display Database Reorganization (DBR) Control Record Information.
ZDBRO IECB	No Changes	Set Database Reorganization (DBR) Input Phase Available ECB Count.
ZDBRO INIT	Changed	Database Reorganization (DBR) Control Records Initialization and Setup.
ZDBRO OECB	No Changes	Set Database Reorganization (DBR) Output Phase Available ECB Count.
ZDBRO RESET	Changed	Reset Database Reorganization (DBR) Information for a Record Type.
ZDBRO RESTART	No Changes	Restart Database Reorganization (DBR) Output Operations.
ZDBRO START	Changed	Start Database Reorganization (DBR) Output Operations.
ZDBRO STATUS	No Changes	Display Database Reorganization (DBR) Output Phase Status.
ZDBRO SWITCH	No Changes	Restart Database Reorganization (DBR) Output Following Tape Error.
ZDBSI RESTART	Changed	Restart Database Reorganization (DBR) Input Operations (Multiple Database Function (MDBF)).
ZDBSI START	Changed	Start Database Reorganization (DBR) Input Operations (Multiple Database Function (MDBF)).
ZDBSO ABORT	No Changes	Abort Database Reorganization (DBR) Processing (Multiple Database Function (MDBF)).
ZDBSO BYPASS	Changed	Bypass Database Reorganization (DBR) Processing of Record Types (Multiple Database Function (MDBF)).
ZDBSO DISPLAY	Changed	Display Database Reorganization (DBR) Control Record Information (Multiple Database Function (MDBF)).
ZDBSO IECB	No Changes	Set Database Reorganization (DBR) Input Phase Available ECB Count (Multiple Database Function (MDBF)).

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZDBSO INIT	Changed	Database Reorganization (DBR) Control Records Initialization and Setup (Multiple Database Function (MDBF)).
ZDBSO OECB	No Changes	Set Database Reorganization (DBR) Output Phase Available ECB Count (Multiple Database Function (MDBF)).
ZDBSO RESET	Changed	Reset Database Reorganization (DBR) Information for a Record Type (Multiple Database Function (MDBF)).
ZDBSO RESTART	No Changes	Restart Database Reorganization (DBR) Output Operations (Multiple Database Function (MDBF)).
ZDBSO START	Changed	Start Database Reorganization (DBR) Output Operations (Multiple Database Function (MDBF)).
ZDBSO STATUS	No Changes	Display Database Reorganization (DBR) Output Phase Status (Multiple Database Function (MDBF)).
ZDBSO SWITCH	No Changes	Restart Database Reorganization (DBR) Output Following Tape Error (Multiple Database Function (MDBF)).
ZDCLV	No Changes	Display Central Processing Unit (CPU) Loop and Create Macro Control Levels.
ZDCOR	Changed	Display Core. The display is based on the main system virtual memory (SVM), and is shown in both hexadecimal and printable characters. The new instruction (INSTR) option enables you to disassemble machine code into assembler instructions. The Help function was added.
ZDCRS	No Changes	Display Computer Room Agent Set (CRAS) Console Status.
ZDDAT	No Changes	Display Date.
ZDDCA	No Changes	Display Main Storage Address of Dump Label.
ZDEAC	No Changes	File Pool Directory Capture.
ZDEAT	New	Display ECB Activation Table (EAT). Display the EAT in order of ascending activation number.
ZDEBE	No Changes	Tape Control and Block Display.
ZDECD	New	Set or Display Address Translation Dump Switches.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZDFIL	Changed	<p>Display File.</p> <p>The input format of the message was changed. The display is now in both hexadecimal and printable characters.</p> <p>4-byte MCHR support was removed; 7-byte MCHR should be used. A new type, GF, is available to designate that the input address is a general file relative record number.</p> <p>The Help function was added.</p>
ZDFPC	No Changes	Display File Pool Counts.
ZDGFL	No Changes	Display General File Label Track.
ZDKAT	No Changes	Display Keypoint Attributes.
ZDLCT	No Changes	Display Line Path Status.
ZDMFS	No Changes	Display Module File Status.
ZDPAT	New	<p>Display Program Allocation Table (PAT).</p> <p>Display an entry in the core copy, file copy, or both copies of the PAT. If you attempt to display an entry associated with a transfer vector, the entry associated with the parent program is displayed instead. See “Modifying and Displaying the Program Allocation Table” on page 268 for more information.</p> <p>Note: You can only display the PAT on the image that is currently active.</p>
ZDPGM	Changed	<p>Display Program.</p> <p>The TYPE parameter is now called the COPY parameter. Use the COPY parameter to display the core copy, file copy, or both copies of a program. You can display the control program and restart area. The new instruction (INSTR) option allows you to disassemble machine code into assembler instructions. The display is now in both hexadecimal and printable characters.</p> <p>You can now specify the version code of the real-time program that you want to display.</p> <p>You can use the new LOADSET parameter to specify the name of the loadset that contains the program to display.</p> <p>You can now display IPLA and IPLB with this command.</p> <p>Note: You can only display a program on the image that is currently active.</p> <p>The Help function was added.</p>
ZDRCT	Changed	<p>Display Routing Control Application Table (RCAT).</p> <p>The new shutdown (SHUT) option allows you to display shutdown RCAT entries.</p>

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZDREC	Changed	Display a Fixed File Record or a Pool Record. The input format of the message was changed. The display is now in both hexadecimal and printable characters. The Help function was added.
ZDSER	No Changes	Display System Error Options.
ZDSID	No Changes	Display System ID.
ZDSMG DEFINE	New	Define a Data Definition. Define a data set to the system and assign a data definition name to that data set. A data set can reside on a tape, general file data set, virtual reader, or user-defined input device.
ZDSMG DISPLAY	Changed	Display a Data Set. Information about data sets that reside on tape, in a virtual reader, or on other user-defined input devices as well as information about general file data sets now displays.
ZDSMG DM	No Changes	Dismount a Data Set.
ZDMSG INIT	No Longer Supported	Initialize.
ZDMSG MT	No Changes	Mount a Data Set.
ZDMSG RELEASE	New	Release a Data Set. Removes a data set from the TPF 4.1 system system. Once a data set is released, it is not defined to the TPF 4.1 system when an initial program load (IPL) is performed.
ZDMSG VTOC	No Changes	VTOC Display.
ZDSPT	No Longer Supported	Display Show Poll Interval. Support for low-speed and airlines line control (ALC) lines
ZDSVC	Changed	Display SVC Code in Hexadecimal. This command now displays the index into the secondary supervisor call (SVC) table (indexed for indexed SVCs).
ZDSYS	No Changes	Display System Operating State.
ZDTAP	Changed	Display Tape Status. Added the ability to display all tape devices assigned to a specified group, or display all devices that are enabled for automatic tape mounting.
ZDTEC	No Longer Supported	Display Error Counters.
ZDTIM	No Changes	Display Time.
ZDTLB	No Changes	Display Tape Label.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZDUMP	Changed	Real-time Manual Dump.
ZDUPD	No Changes	Online Directory Update.
ZDVSN	No Changes	Display Volume Serial Number (VSN)
ZDWGT	No Changes	Display or Modify Terminal Address Table (WGTA) Control Information.
ZECBL	No Changes	Long Life ECB Display and Exit Message.
ZFCAP ABORT ALL	No Changes	Abort Capture of All Modules.
ZFCAP ABORT MOD	No Changes	Abort Capture of Individual Modules.
ZFCAP ALL	Changed	Start Capture of All Modules.
ZFCAP ALTER	No Changes	Change Number of Simultaneous Disk Captures.
ZFCAP CHANGE	New	Change Capture Maximums.
ZFCAP CLEAR	No Changes	Restore Capture Keypoint.
ZFCAP DISPLAY	New	Display Capture Maximums.
ZFCAP EXCEP	No Changes	Start Exception Recording.
ZFCAP IOTIME	No Changes	Alter Input/Output (I/O) Delay Time Factor, Display I/O Delay Time Factor.
ZFCAP LOG START	No Changes	Start Record Logging.
ZFCAP LOG STOP	No Changes	Stop Record Logging.
ZFCAP MISC R	No Changes	Restore Keypoint Capture.
ZFCAP MISC S	No Changes	Start Keypoint Capture.
ZFCAP MOD	Changed	Start Capture of Individual Modules.
ZFCAP PAUSE	No Changes	Pause Capture.
ZFCAP RESTART	No Changes	Restart Capture.
ZFCAP SEXPT	No Changes	Stop Exception Recording.
ZFCAP STATUS	No Changes	Display Status and Progress of Capture.
ZFCAP TAPE ADD	No Changes	Add Tape Drives.
ZFCAP TAPE ALT	New	Add Alternate Tape Drive.
ZFCAP TAPE DEL	No Changes	Delete Tape Drives.
ZFDNT	No Changes	Dismount General File.
ZFKPA	No Changes	Reply to Insufficient Core Message.
ZFMNT	No Changes	Mount General File.
ZFMSG	New	Process Command Characteristics. Display or change the operational characteristics of a command. You can also use the ZFMSG command to create new commands online.
ZFRST ABORT ALL	No Changes	Abort Restore of All Modules.
ZFRST ABORT MOD	No Changes	Abort Restore of Individual Modules.
ZFRST ALTER	No Changes	Change the Number of Simultaneous Disk Restores.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZFRST CAP ALL	No Changes	Start Restore of All Modules.
ZFRST CAP MCHR	No Changes	Start Restore of a Specified Address Range.
ZFRST CAP MOD	No Changes	Start Restore of Individual Modules.
ZFRST CLEAR	No Changes	Restore Capture and Restore Keypoint.
ZFRST KPT	No Changes	Restore Keypoint Records.
ZFRST LOG	No Changes	Start Restore of Logging Records.
ZFRST PAUSE	No Changes	Pause Restore.
ZFRST RESTART	No Changes	Restart Restore.
ZFRST STATUS	No Changes	Display Status and Progress of Restore.
ZFRST STATUS MODULE	No Changes	Display All Modules in Particular Status, Display Status of Module.
ZFRST TAPE ADD	Changed	Add Tape Drives.
ZFRST TAPE ALT	No Changes	Add Alternate Tape Drive.
ZFRST TAPE DEL	No Changes	Delete Tape Drives.
ZFRST XCP	No Changes	Start Restore of Exception Recording Records.
ZGAFA	No Changes	Get File Pool Address.
ZGAFI	No Changes	Get File Pool Address by ID.
ZGFSP	No Changes	Miscellaneous File Pool Functions.
ZIDOT	New	Display and modify dump override table. See “Controlling Dump Content” on page 237 for more information.
ZIFIL	Changed	Initialize Fixed File Data Records. The processor, I-stream, and subsystem user (SSU) unique records can be altered.
ZIMAG CLEAR	New	Clear a TPF Image.
ZIMAG COPY	New	Copy Image Components.
ZIMAG DEFINE	New	Define a TPF Image.
ZIMAG DISABLE	New	Disable a TPF Image.
ZIMAG DISPLAY	New	Display a TPF Image.
ZIMAG ENABLE	New	Enable a TPF Image.
ZIMAG HELP	New	Display Help Information.
ZIMAG KEYPT	New	Copy/Restore/Delete Image Keypoints.
ZIMAG KEYPT ABORT	New	Abort Keypoint Move/Delete Request.
ZIMAG KEYPT CONT	New	Continue Keypoint Move/Delete Request.
ZIMAG MAKEPHYS	New	Overlay Logically Referenced Image Components.
ZIMAG PRIMARY	New	Set the Primary Image.
ZIMAG UNREF	New	Delete Logically Referenced Image Components.
ZIUMP	New	Initialize Unsolicited Package Records.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZLACL	Changed	<p>Alter CCP Restart/Shutdown Polling Controls.</p> <p>This command supports only binary synchronous communication (BSC), synchronous link control (SLC), and 3270 local lines. The LS, HS, and AR/FR parameters are no longer supported.</p> <p>The shutdown and restart levels are based on the size of the input list. The secondary shutdown level for SLC and BSC is no longer supported. The input ENQ discard level for SLC is also no longer supported.</p>
ZLAEC	No Changes	Alter CCP Error Counts.
ZLAPR	No Changes	Alter Binary Synchronous Communication (BSC) Priority.
ZLASL	No Changes	Alter Binary Synchronous Communication (BSC) Send Limit.
ZLASN	Changed	<p>Assign a Line.</p> <p>The HS, LS, and AR parameters are no longer supported.</p>
ZLASN CU	No Changes	Assign a Control Unit.
ZLASP	No Changes	Alter Binary Synchronous Communication (BSC) Multipoint Line Slow Pool Interval.
ZLATO	No Longer Supported	Alter Binary Synchronous Communication (BSC) Multipoint Line Timeout Interval.
ZLDCL	No Changes	Display CCP Restart/Shutdown Polling Controls.
ZLDLE	Changed	<p>Display CU and Line Error Counts.</p> <p>The HS, LS, and AR parameters are no longer supported.</p>
ZLDLS	No Longer Supported	Display Line Status.
ZLDLS AI	No Changes	Display Synchronous Link Line Status.
ZLDLS BS	No Changes	Display Binary Synchronous Communication (BSC) Line Status.
ZLDLS CU	No Changes	Display Communications Control Unit Status.
ZLDLS LC	No Changes	Display 3270 Local Line Status.
ZLDLS PS	No Changes	Display Pseudo Lines.
ZLDPT	No Longer Supported	<p>Display Current Gradual Poll Table Number.</p> <p>Support for low-speed and high-speed airlines line control (ALC) lines was dropped.</p>
ZLDRS	No Longer Supported	<p>Display Low-Speed Line Balancing Ratios.</p> <p>Support for low-speed lines was dropped.</p>
ZLDTE	No Longer Supported	<p>Display Terminal Interchange (TI) Error Count.</p> <p>Support for low-speed and high-speed lines was dropped.</p>

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZLDTI	Changed	Display Terminal Interchange (TI) Status. The HS and LS parameters are no longer supported.
ZLHUB	No Longer Supported	Alter Polling to Hub Poll. Support for high-speed lines was dropped.
ZLIDL	Changed	Idle a Line. The HS, LS, and AR parameters are no longer supported.
ZLIDL CU	No Changes	Idle a Control Unit.
ZLKST	No Changes	Display Synchronous Link Statistics.
ZLKTF	No Changes	Stop Synchronous Link Control (SLC) Link Trace.
ZLKTN	No Changes	Start Synchronous Link Control (SLC) Link Trace.
ZLREP	Changed	Replace a Line. The PS, PT, HS, LS, and AR parameters are no longer supported.
ZLREP CU	No Changes	Replace a Control Unit.
ZLREP PT	No Longer Supported	Alter Current Gradual Poll Table.
ZLREP RS	No Longer Supported	Alter Low-Speed Line Balancing Ratios.
ZLRES	No Longer Supported	Alter (Reset)Terminal Interchange (TI). Support for EP/ALC, ARINC, LSCT, and LSFR was dropped.
ZLROL	No Longer Supported	Alter Polling to Roll Call Poll. Support for airlines line control (ALC) was dropped.
ZLRST	Changed	2946-1980-24 Terminal Reset. This command supports only the network extension facility (NEF). Internal changes due to dropping of EP/ALC, ARINC, LSCT, and LSFR protocols.
ZLSOF	No Longer Supported	Stop Teleprocessor Network Simulator/Emulator Program (TPNS/EP) Simulator Operation. Support for EP/ALC, ARINC, LSCT, and LSFR was dropped.
ZLSON	No Longer Supported	Start Teleprocessor Network Simulator/Emulator Program (TPNS/EP) Simulator Operation. Support for EP/ALC, ARINC, LSCT, and LSFR was dropped.
ZLSTA AI	No Change	Start Synchronous Link Lines.
ZLSTA ALL	No Change	Start All Lines.
ZLSTA AR	No Longer Supported	Start an RINC Line or All ARINC Lines.
ZLSTA BS	No Changes	Start Binary Synchronous Communication (BSC) Lines.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZLSTA HS	No Longer Supported	Start a High-Speed Line or All High-Speed Lines.
ZLSTA LC	No Change	Start 3270 Local Lines.
ZLSTA LS	No Longer Supported	Start a Low-Speed Line or All Low-Speed Lines.
ZLSTA PS	No Changes	Start Pseudo Lines.
ZLSTP AI	No Changes	Stop Synchronous Link Lines.
ZLSTP ALL	No Changes	Stop All Lines.
ZLSTP AR	No Longer Supported	Stop an ARINC Line or All ARINC Lines.
ZLSTP BS	No Changes	Stop Binary Synchronous Communication (BSC) Lines.
ZLSTP HS	No Longer Supported	Stop a High-Speed Line or All High-Speed Lines.
ZLSTP LC	No Changes	Stop 3270 Local Lines.
ZLSTP LS	No Longer Supported	Stop a Low-Speed Line or All Low-Speed Lines.
ZLSTP PS	No Changes	Stop Pseudo Lines.
ZLTOF	No Longer Supported	Invalidate a TIA or Time-of-Day (TOD) Synchronization Compatibility (TSC).
ZLTOF BS	No Changes	Invalidate a Binary Synchronous Communication (BSC) Multipoint Line Station.
ZLTON	No Longer Supported	Validate a TIA or Time-of-Day (TOD) Synchronization Compatibility (TSC).
ZLTON BS	No Changes	Validate a Binary Synchronous Communication (BSC) Multipoint Link Station.
ZLTRF	No Changes	CCP Trace Termination.
ZLTRL	Changed	Initiate In-Core CCP Trace Recording.
ZLTRN	Changed	Initiate CCP Trace to Tape.
ZLTST	No Changes	Perform Synchronous Link P1024 Tests.
ZLVAL	No Longer Supported	Validate a Line.
ZLVAL AI	No Changes	Validate a Synchronous Link Line.
ZLVAL BS	No Changes	Validate a Binary Synchronous Communication (BSC) Line.
ZMCHR	No Changes	Convert file address reference format (FARF) File Addresses to Extended MCHR Format Addresses.
ZMCPY ALL	No Changes	All File Copy.
ZMCPY ABORT	No Changes	File Copy Abort.
ZMCPY RESTART	No Changes	File Copy Restart.
ZMEAS	No Changes	a/cn/mmss/sls2s3s4 x — Start Data Collection in Sampling Mode.
ZMEAS END	No Changes	Stop Data Collection.
ZMEAS Sctt x	No Changes	Start Data Collection in Test Mode (continuous).
ZMEAS Ta/cn/mmss/sls2s3s4 x	No Changes	Start Data Collection in Test Mode (continuous).
ZMEAS TSctt x	No Changes	Start Data Collection in Test Mode (continuous).

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZMODE	New	Change Address Dispensing Mode. Use this command to change address dispensing modes (file address reference format 3 (FARF3), file address reference format 4 (FARF4), or file address reference format 5 (FARF5)) or to display the current address dispensing mode.
ZMPIF DEFINE DEVICE	No Changes	Define Device.
ZMPIF DEFINE PATH	No Changes	Define Path.
ZMPIF DELETE	No Changes	Delete Paths or a Device.
ZMPIF DISPLAY	No Changes	Display Parameters.
ZMPIF HDW	No Changes	Hardware Table Record Verification.
ZMPIF KPE	No Changes	Keypoint E Verification.
ZMPIF PDR	No Changes	Path Definition Record Verification.
ZMPIF SET	No Changes	Set Parameters.
ZMPIF START	No Changes	Start a Path/Device.
ZMPIF STOP	No Changes	Stop a Path/Device.
ZMPIF TRACE	No Changes	Trace Path/User.
Z Mxyy	No Changes	Modify Scroll Display.
ZN	No Longer Supported	Request Continuation of Output. Replaced by the ZPAGE command.
ZNACT	No Changes	Alter Systems Network Architecture (SNA) Path (Alternate to Prime).
ZNALS	Changed	Display Adjacent Link Station (ALS) Status. A column was added to the display to indicate whether the path information unit (PIU) trace facility is active or inactive.
ZNALT	No Changes	Alter Systems Network Architecture (SNA) Printer Path (Prime to Alternate).
ZNCCB	Changed	Initialize/Display CCB Information. For display, the conversation control block (CCB) can now be specified only by ordinal number. You can now display a list of CCB IDs for a particular logical unit (LU). The information displayed now includes the session control block (SCB) address. You can also display CCB information about mapped conversations.
ZNCNS CHANGE	New	Change Session Limit.
ZNCNS INITIALIZE	New	Initialize Session Limit.
ZNCNS RESET	New	Reset Session Limit.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZNCVT	Changed	Convert SNA Resource Addresses. You can specify either a resource identifier (RID) or a session control block (SCB) ID. The SCB ID is used for TPF/APPC sessions.
ZNDLU	Changed	Display Logical Unit (LU) Information. Use the new MODE parameter to display specific mode information associated with a remote TPF/APPC LU. You must specify a particular APPC resource name in the ID parameter along with the MODE parameter. Information was added to the STATUS column of the display to indicate whether the path information unit (PIU) trace facility is active or inactive.
ZNERR	No Changes	Display or Zero 37x5 NSC Error Counter.
ZNETW DISPLAY	No Changes	Display Network Subareas Status.
ZNETW ACT	Changed	Activate a Network Addressable Unit (NAU). You can no longer activate an LU 6.2 session with this functional message. Use the ZNCNS command instead.
ZNETW INACT	Changed	Deactivate a Network Addressable Unit (NAU). The processing for the inactivation of a TPF/APPC primary LU (PLU) that has secondary LU (SLU) threads has changed.
ZNETW MOUNT	New	Mount a PU 2.1 Channel Adapter.
ZNETW ROUTING	No Changes	Display Route Information.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZNKEY	Changed	<p>Display/Alter the Systems Network Architecture (SNA) Communications Keypoint.</p> <p>Use the MAXSCB keyword to display the maximum number of session control blocks (SCBs) that are defined to the TPF/APPC sessions.</p> <p>Use the MAXSNF keyword to display the number of slots in the sequence number field table.</p> <p>Use the PARACOS keyword to display the class of service name that the TPF 4.1 system uses while building a CDINIT response for a TPF/APPC parallel session.</p> <p>Use the SINGMODE keyword to define the mode name used for TPF/APPC single sessions initiated by the TPF 4.1 system.</p> <p>Use the SNAPOLL keyword to display or change the SNA polling interval. The value can range from 1 to 5, where 1 represents 10 milliseconds (ms), 2 represents 20 ms, and so on, up to a maximum of 50 ms.</p> <p>Use the TRACSZ keyword to display the size of the PIU trace table. The size of the table is represented in 4 KB page units.</p>
ZNLM	No Changes	Logon Manager Operator Command Entry.
ZNMON	No Changes	Display Systems Network Architecture (SNA) Resource Statistics.
ZNNCB	No Changes	Initialize Node Control Block (NCB).
ZNNCS	No Changes	Display Network Command Status Table (NCST).
ZNOPL FALLBACK	New	Fall Back to Old Definitions.
ZNOPL LOAD	New	Load Systems Network Architecture (SNA) Network Definitions.
ZNOPL STATUS	New	Display systems network architecture (SNA) Resource Status.
ZNOPL UPDATE	New	Update Dynamic Load.
ZNPIU	Changed	<p>Display Path Information Unit (PIU) Trace Table.</p> <p>For TPF/APPC sessions, displays the session control block (SCB) ID.</p> <p>Additional parameters were added for the TPF 4.1 system.</p> <p>Up to 999 entries from the PIU trace table can be displayed on the screen.</p> <p>There are now three different ways to present the PIU data on the screen. You can present the PIU data in a compacted display, a formatted display, or a long display.</p>

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZNPOL START	No Changes	Start Polling a Systems Network Architecture (SNA) Resource.
ZNPOL STOP	No Changes	Stop Polling a Systems Network Architecture (SNA) Resource.
ZNPRG	No Changes	Purge Output Message Transmitter (OMT) Queue.
ZNRPT	No Changes	Repeat Last Output Message Transmitter (OMT) Message.
ZNRVT	Changed	<p>Display Resource Vector Table (RVT) Addresses and Contents.</p> <p>The display is now in both hexadecimal and printable characters.</p> <p>For the ZNRVT DISPLAY command, use the new MODES parameter to display all the TPF/APPC session modes associated with this partner logical unit (LU). The MODES parameter is not valid unless the partner LU is a TPF/APPC type.</p>
ZNRVT INITIALIZE	No Changes	Initialize Resource Vector Table (RVT).
ZNSCB	New	<p>Display Session Control Block (SCB).</p> <p>Display SCBs for TPF/APPC sessions.</p>
ZNSCB INITIALIZE	New	<p>Initialize Session Control Block (SCB).</p> <p>Initialize SCBs for TPF/APPC sessions.</p>
ZNSID	New	<p>Side Information Table Function.</p> <p>Initialize, display, change, add, or remove entries from the side information table. You can also use the ZNSID command to load entries to the online side information table from a side information data set that was generated offline.</p>
ZNSPA	No Changes	Initialize Scratchpad Area (SPA).
ZNTRP	Changed	<p>Path Information Unit (PIU) Trace Facility.</p> <p>This command can now be used to activate and deactivate the PIU trace facility. It can also be used to specify which resources to trace, to specify whether or not to automatically write each 4 KB block to the real-time tape once the 4 KB block is full, to display the status of the PIU trace facility, and to specify the length of the request/response unit (RU) to store in the PIU trace table.</p>
ZOLDR ACCEPT	New	<p>Accept a Loadset.</p> <p>The programs in the specified loadset replace the programs at the allocated addresses.</p>
ZOLDR ACTIVATE	New	<p>Activate a Loadset.</p> <p>The programs in a specified loadset become available for use by new ECBs.</p>

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZOLDR ALTER	New	Alter E-Type Loader Rules, Alter E-Type Loader Values. Changes the allocation characteristics of unallocated programs that are loaded and activated using the E-type loader. Also changes values that are used during E-type loader processing.
ZOLDR CLEAR	New	Structure Initialization. Initializes all the file resident E-type loader structures.
ZOLDR DEACTIVATE	New	Deactivate a Loadset. Prevents new ECBs from entering the programs contained in a specified loadset.
ZOLDR DELETE	Changed	Delete a Loadset. Returns E-type loader fixed file records to the TPF 4.1 system.
ZOLDR DISPLAY	Changed	Display E-Type Loader Information. Displays information about loadsets, specific programs contained in loadsets, the current program allocation characteristics, and the E-type loader default values that are currently defined in the TPF 4.1 system.
ZOLDR EXCLUDE	New	Loadset Manipulation. Removes one or more programs from a specified loadset.
ZOLDR FLBK	No Longer Supported	E-Type Loader Fallback.
ZOLDR LOAD	Changed	Load a Loadset. Reads sets of programs from an input device and loads the programs to the TPF 4.1 system.
ZOLDR RECLAIM	New	Build and Recover E-Type Loader Records. Rebuilds the E-type loader database.
ZOLDR REINCLUDE	New	Loadset Manipulation. Adds one or more programs to a specified loadset.
ZOLDR REST	No Longer Supported	E-Type Loader Restart.
ZPAGE	New	Continue Output. Replaces the ZN command. Use the ZPAGE command to continue displaying the output of a command when there is more information than can be displayed on the screen at one time.
ZPATH	No Changes	Path Management.
ZPLMT	No Changes	Purge long message transmitter (LMT)/output message transmitter (OMT) queue.
ZPOOL	Changed	Convert Pool Directories or Reset Pool Function Switches.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZPROT	No Changes	Add/Delete a Utility Name, Assign/Release Utility Resource Ownership, Assignment of Capture and Restore Utility, Display Ownership.
ZPSMS	No Changes	Processor Status Management Services.
ZPTAP	No Changes	Print Tape Status.
ZPTCH	New	Maintain Memory Patch Decks. Maintains and processes groups of storage-altering commands (such as ZACOR, ZADCA, and ZAPGM). See "Maintaining Memory Patch Decks" on page 271 for more information.
ZPUMP	No Changes	Police Unsolicited Message Directory Items.
ZRCBI	No Changes	Initialize Routing Control Blocks.
ZRCRS	No Changes	Route Message to Computer Room Agent Set (CRAS) Console.
ZRECP	No Changes	Online File Recoup.
ZRFPC	No Changes	Reconcile File Pool Counts.
ZRHLD	No Changes	Delete Lock Names.
ZRHLD	Changed	Display Lock Names.
ZRHLD	No Longer Supported	Set Format.
ZRIPL	No Changes	Control Program (CP) Restart (IPL).
ZRLMT	No Changes	Repeat Last Long Message Transmitter (LMT)/Output Message Transmitter (OMT) Message.
ZROUT START	New	Start an Application Active in the Routing Control Application Table (RCAT).
ZROUT STOP	New	Stop an Application in the Routing Control Application Table (RCAT).
ZROUT STPI	No Longer Supported	Stop an Application in the Routing Control Application Table (RCAT).
ZROUT STPN	No Longer Supported	Stop an Application in the Routing Control Application Table (RCAT).
ZROUT STRT	No Longer Supported	Start an Application Active in the Routing Control Application Table (RCAT).
ZRPGM	Changed	Retrieve and Lock Program. Use the new LOADSET parameter to specify the name of the loadset that contains the version of the program. The display now shows the core address, loadset name, and an activated/deactivated indicator for the version that corresponds to the ECB that issued the ZRPGM command. The ZRPGM ALL command displays all programs and versions locked in main storage, as well as the loadset name, main storage address, and file address for each program version.
ZRSTT	No Changes	Direct Access Storage Device (DASD) Path and Status Verification.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZRTCUC	Changed	Record Type Conversion Utility.
ZRTDM DISPLAY OVERRIDES	No Changes	Display Pool Overrides.
ZRTDM DISPLAY RECID	No Changes	Display Record ID Attribute Table (RIAT) Entries.
ZRTDM MODIFY OVERRIDES	No Changes	Modify Pool Overrides.
ZRTDM MODIFY RECID	Changed	Modify Record ID Attribute Table (RIAT) Entries.
ZSDEA	No Changes	Online Pool Area Deactivation.
ZSELD	No Changes	Start Selective File Dump (SFD).
ZSIPC	No Longer Supported	Alter System Interprocessor Information for DASD IPC, Display System Interprocessor Information for DASD IPC.
ZSIPC	No Changes	Alter System Interprocessor Information for MPIF IPC, Display System Interprocessor Information for MPIF IPC.
ZSLDR	Changed	Activate Data Loader. For loading Systems Network Architecture (SNA) definitions, use the ZNOPL LOAD command rather than the ZSLDR LOAD DATA command. Other functions are unchanged.
ZSNDA	No Changes	Send Unsolicited System Message to Applications.
ZSNDU	No Changes	Send Unsolicited System Message to Consoles or Logical Units (LUs).
ZSONS ALTER ERROR COUNTS	No Changes	Alter Disk Error Counts.
ZSONS ALTER ERROR LIMITS	No Changes	Alter Error Limits.
ZSONS ALTER HALT	No Changes	Alter Halt Timeout Value.
ZSONS ALTER SCAN	No Changes	Alter Scan Time Value.
ZSONS DISPLAY ERROR COUNTS	No Changes	Display Disk Error Counts.
ZSONS DISPLAY ERROR LIMITS	No Changes	Display Error Limits.
ZSONS DISPLAY HALT	No Changes	Display Halt Timeout Value.
ZSONS DISPLAY SCAN	No Changes	Display Scan Time Value.
ZSPER	New	Alter and Display Program Event Recording (PER) Options. Use to specify events to be trapped by the program event recording (PER) trace facility.
ZSQLD	No Changes	Display and Maintain the Structured Query.
ZSQLD ADD	Changed	Display and Maintain the Structured Query.
ZSQLD DISPLAY	No Changes	Display and Maintain the Structured Query.
ZSQLD INITIALIZE	No Changes	Display and Maintain the Structured Query.
ZSQLD MODIFY	Changed	Display and Maintain the Structured Query.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZSQLD REMOVE	No Changes	Display and Maintain the Structured Query.
ZSTAT	Changed	Display System Status. System shutdown values are now specified in terms of frames, common blocks, ECBs, input/output blocks (IOBs), and system work blocks (SWBs) (128, 381, and 1055 byte blocks).
ZSTIM A	Changed	Added the TIME=NORM parameter option.
ZSTIM C	Changed	Cancel a Time- or Stage-Initiated Message. The STMC0001I message is issued now as a result of this command. Previously, the STMD0001I message was issued for the ZSTIM C command as well as the ZSTIM D command. Note: This is a code-only change. There are no publication impacts to <i>Messages (System Error and Offline)</i> and <i>Messages (Online)</i> .
ZSTIM D	Changed	Display Time-Initiated Message Table. For an index that is not valid, this command still issues the CSMP0097I and STMD0001E messages but no longer issues the CSMP0097I and STMD0001I messages.
ZSTIM I	No Changes	Initialize Time-Initiated Message Table.
ZSTOP	No Changes	Stop Real-Time-Trace (RTT).
ZSTRC	New	Alter and Display System Trace Options. Alter and display system trace options. You can use this message to turn on and off, or display, macro, system log, I/O, Enter/Back, branch traces, block checking mode, and virtual-equals-real (VEQR) logging. See "System Log Trace Facility" on page 298 for more information.
ZSTTD	No Changes	Display the SQL Trace Table Entries.
ZSTVS CLOCK	No changes	System Test Vehicle (STV) System Clocks Modification.
ZSTVS START	No Changes	Start System Test Vehicle (STV).
ZSTVS DSPLY	No Change	Display System Test Vehicle (STV).
ZSTVS PAUSE	Changed	Pause System Test Vehicle (STV).
ZSTVS STOPT	No Changes	Stop System Test Vehicle (STV).
ZSTVS TEST RESET	No Changes	Reset Program Test Vehicle (PTV).
ZSTVS TEST YES	Changed	Set Program Test Vehicle (PTV) to Phase 3.
ZSTVS TEST STV	No Changes	Set Program Test Vehicle (PTV) to System Test Vehicle (PTV) Phase.
ZSTVS TEST LIVE	No Changes	Deactivate Program Test Vehicle (PTV).
ZSTVS TEST END LIVE	No Changes	End Live Input from Consoles.
ZSYSG ALTER	New	Alter System Generation Option Values. Added the BPLOAD parameter.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZSYSG DISPLAY	New	Display System Generation Option Settings.
ZTDEV	New	Modify and Display Tape Device Status for Automatic Tape Mounting. Enable or disable a tape device for automatic tape mounting. Assign or unassign a tape device to or from a tape group.
ZTERM	No Changes	Display Console Information.
ZTEST	No Changes	System Test Driver.
ZTGRP	New	Define, Delete, and Display Tape Groups. Define and display tape groups for automatic tape mounting.
ZTHLT	No Changes	Stop Selective File Dump and Trace (SFDT).
ZTICL	No Changes	Emergency Tape Removal.
ZTINT	No Changes	Initialize Tape.
ZTLBL	Changed	Tape Label Maintenance. Added the ability to assign tape labels to tape groups.
ZTLMR	No Changes	Tape Label Record Initialization.
ZTMNT	No Changes	Tape Mount. Added the ability to mount an active or standby output tape on a device with an alternate (ALT) tape already mounted on it.
ZTOCU	No Changes	Tape Dismount by Logical Control Unit.
ZTOFF	Changed	Dismount, Rewind, and Unload Tape. Added the ability to rewind and unload a cartridge from a device that does not yet have a tape mounted.
ZTPLD	Changed	Activate Auxiliary Loader. You can use this message to load program data from tape or from a general data set (GDS) to a specified TPF image. The image cannot be enabled.
ZTPSW	No Changes	Manual Tape Switch.
ZTRAC	No Changes	Start Real-Time Trace (RTT).
ZTRCC	No Longer Supported	Activate/Deactivate ECB Check. There is no replacement.
ZTRCE	No Changes	Start Selective File Dump and Trace (SFDT).
ZTRDY	No Longer Supported	Ready Tape.
ZTRMT	No Changes	Remount Tape.
ZTSAL	No Longer Supported	Display Program File/Main Storage Address, Load Online Allocator. Replaced by the ZDPAT command.

Table 24. Changes to Commands for the TPF 4.1 System (continued)

Command	New, Changed, No Changes, or No Longer Supported?	Description of Change
ZTSTB	No Changes	Display Tape Status Table Entry.
ZTVAR	No Changes	Tape Reconfiguration.
ZTWTM	No Changes	Write Tape Marks.
ZVFAC DEFINE	Changed	Define Virtual File Access (VFA) Resources.
ZVFAC DISABLE	New	Disable.
ZVFAC DISPLAY	No Changes	Display Virtual File Access (VFA) Resources.
ZVFAC ENABLE	New	Enable.
ZVFAC FLUSH	New	Flush.
ZVFAC INDICATE	No Changes	Indicate Virtual File Access (VFA) Measurements.
ZVFAC LOCATE	Changed	Locate Virtual File Access (VFA) Residents.
ZVFAC PURGE	New	Purge.
ZVFAC START	No Longer Supported	Start Virtual File Access (VFA).
ZVFAC STOP	No Longer Supported	Stop Virtual File Access (VFA).
Z3705 DSP	No Changes	Display 3705 Status.
Z3705 DMP	No Changes	Dump 3705 Control Unit.
Z3705 IPL	No Changes	IPL 3705 Control Unit.
Z3705 CLD	No Changes	Load 3705 Modules to Online System.
Z3705 PRG	No Changes	Purge 3705 Dump From Online System.
Z3705 RNT	No Changes	Reinitialize 3705 Status Indicators.
Z3705 SCR	Changed	Scratch 3705 Module References.
Z3705 TRC	No Changes	3705 Emulation Program (EP) Dynamic Line Trace.

New, Changed, and Obsolete System Errors and Messages

This section identifies the system errors, online messages, and offline messages for the TPF 4.1 system that are new, changed, and no longer supported. You can use the information in this section to determine whether you should make any changes to the automation packages used in your complex.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Note: In the TPF 4.1 system, most messages have a four-digit message number. Existing message numbers are padded to the left with zeros (0s) to effect this change. For example, online message number ACRS36I (in the TPF 3.1 system) becomes ACRS0036I in the TPF 4.1 system.

Table 25 on page 85 summarizes message (offline and online messages) and system error changes for the TPF 4.1 system.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information,

the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Table 25. Changes to Messages and System Errors in the TPF 4.1 System

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000001	System Error	Changed
000002	System Error	New
000003	System Error	Changed
000004	System Error	New
000009	System Error	No Longer Supported
00000A	System Error	No Longer Supported
00000C	System Error	Changed
000011	System Error	Changed
000012	System Error	New
00001D	System Error	No Longer Supported
00001E	System Error	No Longer Supported
000019	System Error	No Longer Supported
000021	System Error	Changed
000022	System Error	Changed
000023	System Error	Changed
000024	System Error	Changed
000025	System Error	No Longer Supported
000026	System Error	Changed
000027	System Error	Changed
00002D	System Error	Changed
00002E	System Error	Changed
00002F	System Error	Changed
000030	System Error	Changed
000032	System Error	Changed
000035	System Error	Changed
000037	System Error	Changed
000038	System Error	Changed
000039	System Error	No Longer Supported
000056	System Error	Changed
000060	System Error	No Longer Supported
000061	System Error	Changed
000062	System Error	Changed
000063	System Error	Changed
000064	System Error	Changed
000065	System Error	Changed
000067	System Error	Changed

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000068	System Error	Changed
000070	System Error	Changed
000074	System Error	Changed
000076	System Error	Changed
000087	System Error	No Longer Supported
000088	System Error	No Longer Supported
000096	System Error	No Longer Supported
000097	System Error	No Longer Supported
00009B	System Error	No Longer Supported
00009C	System Error	No Longer Supported
00004C	System Error	New
000066	System Error	New
00006A	System Error	New
00006B	System Error	New
00006C	System Error	New
000075	System Error	New
000079	System Error	New
00007A	System Error	New
00007B	System Error	New
0000A1	System Error	No Longer Supported
0000AB	System Error	No Longer Supported
0000AC	System Error	No Longer Supported
0000B0	System Error	Changed
0000B2	System Error	No Longer Supported
0000B7	System Error	No Longer Supported
0000C0	System Error	New
0000D5	System Error	New
0000D8	System Error	New
0000E0	System Error	No Longer Supported
0000E1	System Error	No Longer Supported
0000E2	System Error	No Longer Supported
0000E3	System Error	No Longer Supported
0000EB	System Error	New
0000EE	System Error	Changed
0000E5	System Error	Changed
0000E8	System Error	New
0000E9	System Error	New
0000F0	System Error	Changed
0000F1	System Error	Changed

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
0000F3	System Error	Changed
0000F4	System Error	Changed
0000F5	System Error	Changed
0000F6	System Error	Changed
00002B	System Error	No Longer Supported
000110	System Error	New
000111	System Error	New
000112	System Error	New
000113	System Error	New
000114	System Error	New
000115	System Error	New
000116	System Error	New
000117	System Error	New
000145	System Error	No Longer Supported
000171	System Error	No Longer Supported
0001C4	System Error	No Longer Supported
0001CA	System Error	New
0001D0	System Error	Changed
0001D2	System Error	Changed
0001D3	System Error	Changed
0001D5	System Error	Changed
0001D6	System Error	New
0001D7	System Error	New
0001F2	System Error	Changed
000290	System Error	Changed
000293	System Error	Changed
000295	System Error	Changed
000296	System Error	No Longer Supported
000297	System Error	No Longer Supported
000298	System Error	No Longer Supported
000299	System Error	No Longer Supported
00029A	System Error	No Longer Supported
00029B	System Error	No Longer Supported
00029C	System Error	No Longer Supported
00029D	System Error	No Longer Supported
00029E	System Error	No Longer Supported
00029F	System Error	No Longer Supported
0002A0	System Error	No Longer Supported
0002A1	System Error	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
0002A2	System Error	No Longer Supported
000301	System Error	No Longer Supported
00030D	System Error	No Longer Supported
000328	System Error	Changed
000329	System Error	Changed
000335	System Error	Changed
000348	System Error	No Longer Supported
000349	System Error	No Longer Supported
000380	System Error	New
000381	System Error	New
000382	System Error	New
000383	System Error	New
00042C	System Error	New
00042D	System Error	New
0004A6	System Error	Changed
0004A7	System Error	Changed
0004A8	System Error	Changed
0004A9	System Error	Changed
0004AA	System Error	Changed
0004AD	System Error	No Longer Supported
0004B4	System Error	No Longer Supported
0004B8	System Error	No Longer Supported
0004C2	System Error	No Longer Supported
0004D2	System Error	No Longer Supported
0004D3	System Error	No Longer Supported
0004D4	System Error	No Longer Supported
0004DE	System Error	No Longer Supported
0004F5	System Error	New
000502	System Error	No Longer Supported
000503	System Error	No Longer Supported
000505	System Error	No Longer Supported
000507	System Error	No Longer Supported
000508	System Error	No Longer Supported
00050A	System Error	No Longer Supported
00050C	System Error	No Longer Supported
00050D	System Error	No Longer Supported
00050F	System Error	No Longer Supported
000511	System Error	Changed
000517	System Error	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000518	System Error	No Longer Supported
000519	System Error	No Longer Supported
00051A	System Error	No Longer Supported
00051B	System Error	No Longer Supported
00051C	System Error	No Longer Supported
00051D	System Error	No Longer Supported
00051E	System Error	No Longer Supported
00051F	System Error	No Longer Supported
000524	System Error	No Longer Supported
000525	System Error	No Longer Supported
000540	System Error	Changed
000541	System Error	Changed
000542	System Error	Changed
000543	System Error	No Longer Supported
000544	System Error	Changed
000545	System Error	No Longer Supported
000546	System Error	No Longer Supported
000548	System Error	No Longer Supported
00054E	System Error	No Longer Supported
000550	System Error	No Longer Supported
000558	System Error	Changed
000571	System Error	Changed
000572	System Error	Changed
000573	System Error	Changed
000654	System Error	No Longer Supported
000655	System Error	No Longer Supported
000656	System Error	No Longer Supported
00065A	System Error	No Longer Supported
00065B	System Error	No Longer Supported
00065C	System Error	No Longer Supported
00065D	System Error	Changed
000660	System Error	No Longer Supported
000661	System Error	No Longer Supported
000662	System Error	No Longer Supported
000666	System Error	No Longer Supported
000667	System Error	No Longer Supported
00066F	System Error	No Longer Supported
00067F	System Error	No Longer Supported
000670	System Error	Changed

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000671	System Error	Changed
000672	System Error	Changed
000673	System Error	Changed
000674	System Error	Changed
000676	System Error	Changed
00067D	System Error	Changed
000696	System Error	Changed
000697	System Error	Changed
000698	System Error	New
0006B1	System Error	No Longer Supported
0006B5	System Error	No Longer Supported
0006B6	System Error	Changed
0006C0	System Error	No Longer Supported
0006C4	System Error	No Longer Supported
0006C5	System Error	No Longer Supported
0006C6	System Error	No Longer Supported
0006C7	System Error	No Longer Supported
0006D0	System Error	No Longer Supported
0006D8	System Error	No Longer Supported
0006D9	System Error	Changed
0006DA	System Error	Changed
0006DB	System Error	New
0006DC	System Error	Changed
0006DD	System Error	Changed
0006DF	System Error	New
0006E0	System Error	New
0006E1	System Error	New
0006E2	System Error	New
0006E5	System Error	Changed
0006E6	System Error	Changed
0006E7	System Error	Changed
0006E8	System Error	Changed
0006E9	System Error	No Longer Supported
0006EA	System Error	No Longer Supported
0006EB	System Error	No Longer Supported
0006EC	System Error	No Longer Supported
0006ED	System Error	New
0006EE	System Error	New
0006EF	System Error	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000700	System Error	No Longer supported
000702	System Error	No Longer supported
000705	System Error	No Longer supported
000732	System Error	New
000733	System Error	New
000735	System Error	New
000736	System Error	New
000737	System Error	New
000738	System Error	New
000739	System Error	New
00073A	System Error	New
00073B	System Error	New
00073C	System Error	New
00073D	System Error	New
00073E	System Error	New
00073F	System Error	New
000740	System Error	New
000741	System Error	New
000742	System Error	New
000743	System Error	New
000744	System Error	New
000745	System Error	New
000746	System Error	New
000747	System Error	New
000748	System Error	New
000749	System Error	New
00074A	System Error	New
00074B	System Error	New
00074C	System Error	New
00074D	System Error	New
00074E	System Error	New
00074F	System Error	New
000750	System Error	New
000751	System Error	New
000760	System Error	New
000761	System Error	New
000762	System Error	New
000763	System Error	New
000764	System Error	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000765	System Error	New
000766	System Error	New
000768	System Error	New
00076A	System Error	New
00076B	System Error	New
00076C	System Error	New
00076D	System Error	New
00076E	System Error	New
00076F	System Error	New
000770	System Error	New
000771	System Error	New
000772	System Error	New
000775	System Error	New
000776	System Error	New
000780	System Error	New
001000	System Error	New
001111	System Error	New
04110D	System Error	Changed
041502	System Error	New
041503	System Error	New
042666	System Error	No Longer Supported
042667	System Error	No Longer Supported
044000	System Error	New
044301	System Error	No Longer Supported
044500	System Error	No Longer Supported
044600	System Error	No Longer Supported
044700	System Error	New
AB0001	System Error	No Longer Supported
AB0003	System Error	No Longer Supported
AB0004	System Error	No Longer Supported
AB0005	System Error	Changed
AB0006	System Error	Changed
AB0007	System Error	Changed
AB0008	System Error	New
AB000B	System Error	New
AB0012	System Error	New
AB0013	System Error	New
AB0014	System Error	New
AB0035	System Error	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
AB0073	System Error	Changed
AB0075	System Error	New
AB00FF	System Error	No Longer Supported
ABORT CP INVALID...	Offline	No Longer Supported
ABORT-ERROR TRYING TO READ/WRITE IMAGE...	Offline	No Longer Supported
ABORT-ERROR TRYING TO READY/WRITE A 4K...	Offline	No Longer Supported
ABORT-LOAD NOT POSSIBLE...	Offline	No Longer Supported
ACLV0011E	Online	New
ACLV0012E	Online	New
ACLV0016E	Online	New
ACPE0002E	Online	No Longer Supported
ACPL0002I	Online	Changed
ACPL0004I	Online	New
ACPL0005I	Online	No Longer Supported
ACPL0017I	Online	New
ACPL0019I	Online	New
ACPL0018I	Online	New
ACPL0021E	Online	Changed
ACPL0022E	Online	Changed
ACPL0023E	Online	Changed
ACPL0024E	Online	Changed
ACPL0026E	Online	Changed
ACPL0027E	Online	Changed
ACPL0028E	Online	Changed
ACPL0029E	Online	Changed
ACPL0030E	Online	Changed
ACPL0031E	Online	No Longer Supported
ACPL0033E	Online	No Longer Supported
ACPL0035E	Online	No Longer Supported
ACPL0037E	Online	No Longer Supported
ACPL0038E	Online	No Longer Supported
ACPL0039E	Online	No Longer Supported
ACPL0041E	Online	No Longer Supported
ACPL0042E	Online	Changed
ACPL0043E	Online	No Longer Supported
ACPL0044E	Online	No Longer Supported
ACPL0045E	Online	Changed

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
ACPL0046E	Online	Changed
ACPL0047E	Online	No Longer Supported
ACPL0048E	Online	Changed
ACPL0049E	Online	Changed
ACPL0051E	Online	Changed
ACPL0053E	Online	No Longer Supported
ACPL0060E	Online	No Longer Supported
ACPL0062E	Online	No Longer Supported
ACPL0063E	Online	Changed
ACPL0068E	Online	No Longer Supported
ACPL0070E	Online	No Longer Supported
ACPL0072E	Online	No Longer Supported
ACPL0073E	Online	No Longer Supported
ACPL0074E	Online	Changed
ACPL0075E	Online	No Longer Supported
ACPL0079E	Online	New
ACPL0080E	Online	New
ACPL0082E	Online	New
ACPL0083E	Online	New
ACPL0084E	Online	New
ACPL0085E	Online	New
ACPL0086E	Online	New
ACPL0087E	Online	New
ACPL0088E	Online	New
ACPL0089E	Online	New
ACPL0090E	Online	New
ACPL0091E	Online	New
ACPL0092E	Online	New
ACPL0093E	Online	New
ACPL0094E	Online	New
ACPL0095E	Online	New
ACPL0096E	Online	New
ADDITIONAL UNRESOLVED VCONS...	Offline	No Longer Supported
AFIL0010I	Online	New
AFIL0011I	Online	No Longer Supported
ALL FILE RES PGMS THAT FOLLOW...	Offline	No Longer Supported
ALO001	Online	No Longer Supported
ALO002	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
ALO004	Online	No Longer Supported
ALO005	Online	No Longer Supported
A MAXIMUM OF 25 PGMS MAY BE LOADED...	Offline	No Longer Supported
AMOD0194T	Online	New
ANOTHER LOADER ACTIVE...	Online	No Longer Supported
APAT0001I	Online	New
APAT0002I	Online	New
APAT0005E	Online	New
APAT0006E	Online	New
APAT0007E	Online	New
APAT0008E	Online	New
APAT0009E	Online	New
APAT0010E	Online	New
APAT0013E	Online	New
APAT0014E	Online	New
ARDR0008E	Online	No Longer Supported
ARDR0009T	Online	No Longer Supported
–ARD– DEVICE NOT AVAILABLE	Online	No Longer Supported
–ARD– PROCESSING COMPLETED	Online	No Longer Supported
–ARD– ROUTINE COMPLETED	Online	No Longer Supported
–ARD– ROUTINE ERROR(S)	Online	No Longer Supported
AREA TO BE PATCHED IS BEYOND...	Offline	No Longer Supported
AREA TO BE PATCHED IS NOT	Offline	No Longer Supported
AREA TO BE PATCHED IS OUTSIDE...	Offline	No Longer Supported
AREC0010I	Online	New
AREC0020I	Online	New
ASER00	Online	No Longer Supported
ASER0000I	Online	New
ASER0001I	Online	Changed
ASER0003I	Online	New
ASER0004I	Online	New
ASER0041I	Online	New
ASER0042I	Online	New
ASER0097I	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
ASPT	Online	No Longer Supported
ASSER0098E	Online	Changed
ASSER0099E	Online	Changed
AURS0007E	Online	New
AURS0008E	Online	New
AURS0009E	Online	New
AURS0010E	Online	New
AURS0011E	Online	New
AURS0012E	Online	New
AURS0013E	Online	New
AURS0015E	Online	New
AURS0016E	Online	New
AURS0019E	Online	New
AURS0020E	Online	New
AURS0021E	Online	New
AURS0022E	Online	New
AURS0050I	Online	New
AURS0051I	Online	New
AURS0052I	Online	New
AURS0053W	Online	New
AURS0054E	Online	New
AURT	Online	No Longer Supported
BCAI	Online	No Longer Supported
BCAI0001A	Online	New
BCAI0002A	Online	New
BMS20001E	Online	New
BMS20003E	Online	New
BMS20004E	Online	New
BMS80000E	Online	New
BMS80004E	Online	New
BMS80008E	Online	New
BMS80012E	Online	New
BMS80016E	Online	New
BMS80020E	Online	New
BMS80024E	Online	New
BMS80028E	Online	New
BMS80032E	Online	New
BMS80036E	Online	New
BMS80040E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BMS80044E	Online	New
BMS80048E	Online	New
BMS80052E	Online	New
BRCP0001E	Online	No Longer Supported
BRCP0002E	Online	No Longer Supported
BRCP0003E	Online	No Longer Supported
BRCP0004E	Online	New
BRCP0013W	Online	No Longer Supported
BUFC0068E	Online	New
BXAR0001E	Online	New
BXAR0002E	Online	New
BXAR0003E	Online	New
BXAR0004E	Online	New
BXAR0007A	Online	New
BXAR0008E	Online	New
BXAR0009A	Online	New
CANNOT EXECUTE OLD FROM LOADER GENERAL...	Online	No Longer Supported
CANNOT FIND CP IN NAME TABLE...	Offline	No Longer Supported
CANNOT LOAD CORE PROGRAMS	Online	No Longer Supported
CA9ACN	System Error	New
CA9DEA	System Error	New
CA9TXC	System Error	New
CBA00001A	Online	No Longer Supported
CBD00001A	Online	No Longer Supported
CBR20006A	Online	Changed
CBS00001A	Online	No Longer Supported
CE16D8	System Error	No Longer Supported
CE16DB	System Error	Changed
CE16DC	System Error	Changed
CE16DE	System Error	New
CE16DF	System Error	New
CE16E0	System Error	New
CE16E1	System Error	New
CE16E7	System Error	Changed
CE16E9	System Error	No Longer Supported
CE16EA	System Error	No Longer Supported
CE16EB	System Error	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CE16EC	System Error	Changed
CE16ED	System Error	New
CE16EE	System Error	New
CE16EF	System Error	New
CE1732	System Error	New
CE1733	System Error	New
CE1734	System Error	New
CE1735	System Error	New
CE1736	System Error	New
CE1737	System Error	New
CE1738	System Error	New
CE1739	System Error	New
CE173A	System Error	New
CE17EB	System Error	New
CE173C	System Error	New
CE173D	System Error	New
CE173E	System Error	New
CE173F	System Error	New
CE1740	System Error	New
CE1741	System Error	New
CE1742	System Error	New
CE1743	System Error	New
CE1744	System Error	New
CE1745	System Error	New
CE1746	System Error	New
CE1747	System Error	New
CE1748	System Error	New
CE1749	System Error	New
CE174A	System Error	New
CE174B	System Error	New
CE174C	System Error	New
CE174D	System Error	New
CE174E	System Error	New
CE174F	System Error	New
CE9014	System Error	No Longer Supported
CE9029	System Error	No Longer Supported
CE9030	System Error	No Longer Supported
CE9034	System Error	No Longer Supported
CE9035	System Error	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CE9040	System Error	No Longer Supported
CE9050	System Error	No Longer Supported
CE9051	System Error	No Longer Supported
CE9105	System Error	No Longer Supported
CE930D	System Error	No Longer Supported
CE94C2	System Error	Changed
CE9511	System Error	Changed
CE9666	System Error	No Longer Supported
CE9667	System Error	No Longer Supported
CCIM0091W	Online	New
CGT40001E	Online	New
CGT40002E	Online	New
CGT40003E	Online	New
CGT40004E	Online	New
CGT40005E	Online	New
CGT40006E	Online	New
CGT40007I	Online	New
CGT40099I	Online	New
CHEB0001I	Online	Changed
CHEB0002W	Online	Changed
CHKB0001I	Online	New
CHKB0002I	Online	New
CHKR0001I	Online	New
CHKR0002I	Online	New
CHKR0003I	Online	New
CHKR0004I	Online	New
CHNX0001I	Online	New
CHQI0001W	Offline	New
CHQI0002W	Offline	New
CHQI0003W	Offline	New
CHQI0004W	Offline	New
CHQI0005W	Offline	New
CHQI0006W	Offline	New
CHQI0007E	Offline	New
CHQI0008E	Offline	New
CHQI0009E	Offline	New
CHQI0011E	Offline	New
CHQI0012E	Offline	New
CHQI0013E	Offline	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CHQI0014E	Offline	New
CHQI0015E	Offline	New
CHQI0016E	Offline	New
CHQI0017E	Offline	New
CHQI0018E	Offline	New
CHQI0019E	Offline	New
CHQI0020E	Offline	New
CHQI0021E	Offline	New
CHQI0022E	Offline	New
CHQI0023E	Offline	New
CHQI0024E	Offline	New
CHQI0025E	Offline	New
CHQI0026E	Offline	New
CHQI0027E	Offline	New
CHQI0028E	Offline	New
CHQI0029E	Offline	New
CHQI0030E	Offline	New
CHQI0031E	Offline	New
CHQI0032E	Offline	New
CHQI0033E	Offline	New
CHQI0034E	Offline	New
CHQI0035E	Offline	New
CHQI0036E	Offline	New
CHQI0037E	Offline	New
CHQI0038E	Offline	New
CHQI0039E	Offline	New
CHQI0040E	Offline	New
CHQI0041E	Offline	New
CHQI0042E	Offline	New
CHQI0043E	Offline	New
CHQI0044E	Offline	New
CHQI0045E	Offline	New
CHQI0046E	Offline	New
CIJH0003E	Online	Changed
CJIW0002I	Online	New
CJIW0003I	Online	New
CJIW0006W	Online	New
CJIW0007W	Online	New
CJIW0008W	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CLID0001E	Online	New
CLID0002E	Online	New
CLID0003E	Online	New
CLID0004E	Online	New
CLID0005E	Online	New
CLID0006E	Online	New
CLKS0075E	Online	New
CLVQ0050A	Online	New
CLXV0001E	Online	New
CMKH0001E	Online	Changed
CMKH0002E	Online	New
CMKH0003E	Online	New
CMKH0004I	Online	New
CMKH0005T	Online	New
CMKH0006A	Online	New
CMKH0007I	Online	New
CMKH0008A	Online	New
CMKH0009E	Online	New
CMKH0011I	Online	Changed
CMKH0012E	Online	New
CMKH0013E	Online	New
CMKH0014E	Online	New
CMKH0015E	Online	New
CMKH0050E	Online	No Longer Supported
CMKH0051E	Online	No Longer Supported
CMKH0060T	Online	No Longer Supported
CMKH0061T	Online	No Longer Supported
CMKH0062E	Online	No Longer Supported
CMKH0063T	Online	No Longer Supported
CMWA0001I	Online	New
CNCE0001E	Online	New
CNCE0002E	Online	New
CNCE0003E	Online	New
CNCE0099T	Online	No Longer Supported
CNOM0001E	Online	New
CNOM0002E	Online	New
CNOQ0002I	Online	New
CNOR0002I	Online	New
CNOR0450E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CNOW0001W	Online	Changed
CNP00101E	Online	No Longer Supported
CNP00102E	Online	No Longer Supported
CNP00103E	Online	No Longer Supported
CNP00201E	Online	No Longer Supported
CNP00401E	Online	No Longer Supported
CNP00402E	Online	No Longer Supported
CNP00403E	Online	No Longer Supported
CNP00501E	Online	No Longer Supported
CNP00502E	Online	No Longer Supported
CNP00750E	Online	No Longer Supported
CNP00801W	Online	No Longer Supported
CNP00802Q	Online	No Longer Supported
COMM0001I	Online	No Longer Supported
CORA0208E	Online	New
CORA0216W	Online	New
CORA0231E	Online	New
CORA0233E	Online	New
CORA0239E	Online	New
CORA0241I	Online	New
CORA0242E	Online	New
CORA0245E	Online	New
CORA0247E	Online	New
CORA0248W	Online	New
CORA0249E	Online	New
CORA0250E	Online	New
CORA0251E	Online	New
CORA0258E	Online	New
CORA0260E	Online	New
CORA0261E	Online	New
CORA0267I	Online	New
CORA0270I	Online	New
CORA0272W	Online	New
CORA0273W	Online	New
CORA0274E	Online	New
CORA0275E	Online	New
CORA0282E	Online	New
CORA0290I	Online	New
CORB0289I	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CORD0205I	Online	New
CORD0207E	Online	New
CORD0209E	Online	New
CORD0210I	Online	New
CORD0211E	Online	New
CORD0214I	Online	New
CORD0215I	Online	New
CORD0218I	Online	New
CORD0220E	Online	New
CORD0221E	Online	New
CORD0222E	Online	New
CORD0223I	Online	New
CORD0226I	Online	New
CORD0227I	Online	New
CORD0228I	Online	New
CORD0229I	Online	New
CORD0230I	Online	New
CORD0236E	Online	New
CORD0254E	Online	New
CORD0265E	Online	New
CORD0287E	Online	New
CORD0212W	Online	New
COREFAST PROGRAMS CANNOT HAVE TRANSFER VECTORS	Offline	No Longer Supported
COREND VALUE NOT SUPPLIED...	Offline	No Longer Supported
CORE PROGRAM ADDRESS IS INVALID	Online	No Longer Supported
CORE0217W	Online	New
CORE0234I	Online	New
CORE0262E	Online	New
COSB0196E	Online	New
COSK0001I	Online	New
COSK0003I	Online	New
COSK0005I	Online	New
COSK0006I	Online	New
COSK0016I	Online	New
COSK0046I	Online	New
COSK0195I	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
COSK0200I	Online	New
COSK0203I	Online	New
COSK0206I	Online	New
COSK0207E	Online	New
COSK0208E	Online	New
COSK0211E	Online	New
COSK0219E	Online	New
COSK0224I	Online	New
COSK0231E	Online	New
COSK0232E	Online	New
COSK0233E	Online	New
COSK0235E	Online	New
COSK0236E	Online	New
COSK0238E	Online	New
COSK0239E	Online	New
COSK0240E	Online	New
COSK0242E	Online	New
COSK0243E	Online	New
COSK0244I	Online	New
COSK0245E	Online	New
COSK0246E	Online	New
COSK0252E	Online	New
COSK0253E	Online	New
COSK0255E	Online	New
COSK0256E	Online	New
COSK0257E	Online	New
COSK0258E	Online	New
COSK0260E	Online	New
COSK0263E	Online	New
COSK0264W	Online	New
COSK0266W	Online	New
COSK0268W	Online	New
COSK0269W	Online	New
COSK0271W	Online	New
COSK0276W	Online	New
COSK0277E	Online	New
COSK0278E	Online	New
COSK0279E	Online	New
COSK0280E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
COSK0281E	Online	New
COSK0283E	Online	New
COSK0284I	Online	New
COSK0285W	Online	New
COSK0286E	Online	New
COSK0288E	Online	New
COSK0291I	Online	New
COTD0197E	Online	New
COTE0001I	Online	New
COTF0204E	Online	New
COTI0237E	Online	New
COTK0193E	Online	New
COTM0192E	Online	New
COTM0194E	Online	New
COTM0199E	Online	New
COTM0237E	Online	New
COTM0288E	Online	New
COTM0292W	Online	New
COTO0288E	Online	New
COTZ0288E	Online	New
COT50001I	Online	New
COT50002I	Online	New
COT50003I	Online	New
COT50004I	Online	New
COT50005I	Online	New
COT50006I	Online	New
COT50012E	Online	New
COT70001I	Online	New
COT70002I	Online	New
COT70003I	Online	New
COT70004I	Online	New
COT70005I	Online	New
COT70010E	Online	New
COT70015E	Online	New
COT70016E	Online	New
COT70017E	Online	New
COT70018E	Online	New
CPAA0001E	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CP CHAIN OVERLAPPING AP...	Offline	No Longer Supported
CP ON LMOD DIFF FROM LEN...	Offline	No Longer Supported
CPSE0003T	Online	New
CPSE0004W	Online	New
CPSE0005W	Online	New
CPSE0009E	Online	New
CPSE0010E	Online	Changed
CPSE0011I	Online	New
CPSE0012I	Online	New
CPSE0013E	Online	New
CPSE0014I	Online	New
CPSE0015I	Online	New
CPSE0016A	Online	New
CPSE0017E	Online	New
CPSE0018E	Online	New
CPSE0019E	Online	New
CPSE0020E	Online	New
CPSE0021A	Online	New
CPSE0022I	Online	New
CPSE0023I	Online	New
CPSE0024A	Online	New
CPSE0025I	Online	New
CPSE0026A	Online	New
CPSE0027E	Online	New
CPSE0050E	Online	Changed
CPSE0051T	Online	Changed
CPSE0052E	Online	Changed
CPSE0053T	Online	Changed
CPSF0021I	Online	New
CPSF0022W	Online	new
CPSF0023W	Online	New
CRD90021I	Online	New
CSG00000I	Online	Changed
CSGI0001I	Online	New
CSG00002I	Online	New
CSG00003I	Online	New
CSG00051I	Online	New
CSON0050E	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CSO60001W	Online	New
CTIN0008E	Online	Changed
CTIN0010E	Online	New
CTIN0014I	Online	Changed
CTIN0016I	Online	Changed
CTIN0017E	Online	New
CTIN0030I	Online	New
CTIN0037I	Online	New
CTIN0068E	Online	Changed
CTIN0072E	Online	Changed
CTIN0076E	Online	No Longer Supported
CTIN0080E	Online	No Longer Supported
CTIN0084E	Online	No Longer Supported
CTIN0091E	Online	No Longer Supported
CTIN0092E	Online	New
CTIN0099I	Online	New
CTKA0001I	Online	New
CTKA0002I	Online	New
CTKA0050E	Online	New
CTKA0051E	Online	New
CTKA0052E	Online	New
CTKA0053E	Online	New
CTKA0056E	Online	New
CTKA0057E	Online	New
CTKA0058E	Online	New
CTKO0001W	Online	New
CTKS0014I	Online	Changed
CTL70002I	Online	No Longer Supported
CT240001I	Online	New
CT240002I	Online	New
CT240003I	Online	New
CT400001I	Online	New
CT400002E	Online	New
CT400003E	Online	New
CT400004E	Online	New
CT400005I	Online	New
CT400006I	Online	New
CT400007I	Online	New
CUKA0023E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CVAD0020E	Online	No Longer Supported
CVCS0003I	Online	New
CVCW0001I	Online	New
CVCW0002I	Online	New
CVHG0001E	Online	No Longer Supported
CVHG0002I	Online	No Longer Supported
CVHG0003I	Online	No Longer Supported
CVHG0004E	Online	No Longer Supported
CVHG0005W	Online	No Longer Supported
CVHG0006W	Online	No Longer Supported
CVHG0007E	Online	No Longer Supported
CVHG0008I	Online	No Longer Supported
CVHG0009E	Online	No Longer Supported
CVHG0010E	Online	No Longer Supported
CVRI0001E	Online	New
CVRI0002E	Online	New
CVRI0003E	Online	New
CVRN0002E	Online	No Longer Supported
CVRN0005W	Online	New
CVRQ0011E	Online	No Longer Supported
CVZB0002E	Online	New
CVZB0001I	Online	New
CWAL0001E	Online	New
CYAE0092E	Online	Changed
CYC10005A	Online	Changed
CYED0002I	Online	No Longer Supported
CYED0003I	Online	No Longer Supported
CYED0006W	Online	No Longer Supported
CZSA0001E	Online	New
CZSA0050I	Online	No Longer Supported
CZSA0051E	Online	No Longer Supported
CZSA0051I	Online	No Longer Supported
CZSA0052E	Online	No Longer Supported
CZSA0052I	Online	No Longer Supported
CZSA0060E	Online	No Longer Supported
CZSA0060I	Online	No Longer Supported
CZSA0061E	Online	No Longer Supported
CZSA0062E	Online	No Longer Supported
CZSA0062I	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CZSA0063I	Online	No Longer Supported
CZSA0064I	Online	No Longer Supported
CZSA0065E	Online	No Longer Supported
CZSA0065I	Online	No Longer Supported
CZSA0070E	Online	No Longer Supported
CZSA0071E	Online	No Longer Supported
CZSA0072E	Online	No Longer Supported
CZSA0073I	Online	No Longer Supported
CZSA0074I	Online	No Longer Supported
CZSA0075E	Online	No Longer Supported
CZSA0076E	Online	No Longer Supported
CZSA0080E	Online	No Longer Supported
CZSA0081E	Online	No Longer Supported
CZSA5000E	Online	No Longer Supported
C6200A	System Error	No Longer Supported
C62012	System Error	Changed
C62014	System Error	No Longer Supported
C6201F	System Error	No Longer Supported
C62020	System Error	No Longer Supported
C62028	System Error	No Longer Supported
C62033	System Error	New
C62042	System Error	No Longer Supported
C6204B	System Error	New
C6204C	System Error	New
C6204D	System Error	New
C6204E	System Error	New
C6204F	System Error	New
C62050	System Error	New
C62051	System Error	New
C62052	System Error	New
C62053	System Error	New
C62054	System Error	New
DADD0001I	Online	New
DADD0002I	Online	Changed
DADD0055E	Online	Changed
DADD0056E	Online	New
DADD0057E	Online	New
DADD0058E	Online	New
DADD0059E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DADD0060E	Online	New
DADF0003E	Online	No Longer Supported
DADF0005E	Online	Changed
DADF0006E	Online	No Longer Supported
DADF0007E	Online	No Longer Supported
DADF0008E	Online	No Longer Supported
DADF0010E	Online	New
DADF0011E	Online	New
DADF0012E	Online	No Longer Supported
DADF0017E	Online	Changed
DADF0018E	Online	New
DADF0020E	Online	No Longer Supported
DADF0021E	Online	No Longer Supported
DADF0023E	Online	No Longer Supported
DADF0024E	Online	No Longer Supported
DADF0033E	Online	No Longer Supported
DADF0042E	Online	Changed
DADF0043E	Online	Changed
DADF0044E	Online	New
DADF0045E	Online	New
DADF0046E	Online	New
DADF0047E	Online	New
DADF0048E	Online	New
DADF0049E	Online	New
DADF0050E	Online	New
DADF0051E	Online	New
DADF0052E	Online	New
DADF0053E	Online	No Longer Supported
DADF0054E	Online	New
DADF0055E	Online	New
DADF0056E	Online	New
DADF0057E	Online	New
DADF0058E	Online	New
DADF0059E	Online	New
DADF0061E	Online	New
DADF0062E	Online	New
DADF0100E	Online	New
DADF0101E	Online	New
DADF0102E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DADF0103E	Online	New
DADF0104E	Online	New
DADF0105E	Online	New
DADF0106E	Online	New
DADF0107E	Online	New
DADF0108E	Online	New
DADF0109E	Online	New
DADF0110E	Online	New
DADF0111E	Online	New
DADF0112E	Online	New
DADF0113E	Online	New
DADF0114E	Online	New
DADF0115E	Online	New
DADF0116E	Online	New
DADF0117E	Online	New
DADF0119E	Online	New
DADF0120E	Online	New
DADF0121E	Online	New
DADF0123E	Online	New
DADF0124E	Online	New
DADF0125E	Online	New
DATA COLLECTION – I/O ERROR...	Online	No Longer Supported
DATA COLLECTION – I/O ERROR WRITING...	Online	No Longer Supported
DATA COLLECTION – JCD TAPE CANNOT...	Online	No Longer Supported
DATA COLLECTION – JCD TAPE IN...	Online	No Longer Supported
DATA COLLECTION – RESET AFTER APPARENT...	Online	No Longer Supported
DATA COLLECTION STARTING...	Online	No Longer Supported
DATA COLLECTION – TEST MODE STARTING...	Online	No Longer Supported
DATA COLLECTION – TEST MODE TERMINATED...	Online	No Longer Supported
DBRI0001E	Online	Changed
DBRI0003E	Online	Changed
DBRI0006E	Online	Changed
DBRI0007E	Online	Changed
DBRI0020I	Online	Changed

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DBRI0021E	Online	Changed
DBRI0022I	Online	Changed
DBRI0023E	Online	Changed
DBRI0024E	Online	Changed
DBRI0027E	Online	Changed
DBRI0029I	Online	New
DBRI0060E	Online	New
DBRI0070E	Online	Changed
DBRI0084T	Online	Changed
DBRI0087I	Online	New
DBRI0089T	Online	New
DBRO00006	Online	No Longer Supported
DBRO0000I	Online	Changed
DBRO0001E	Online	Changed
DBRO0002E	Online	Changed
DBRO0003E	Online	Changed
DBRO0004E	Online	Changed
DBRO0005E	Online	Changed
DBRO0008I	Online	Changed
DBRO0009E	Online	Changed
DBRO0010I	Online	Changed
DBRO0012I	Online	Changed
DBRO0013E	Online	Changed
DBRO0014I	Online	Changed
DBRO0015I	Online	Changed
DBRO0016I	Online	Changed
DBRO0017I	Online	Changed
DBRO0018I	Online	Changed
DBRO0019A	Online	Changed
DBRO0021E	Online	New
DBRO0025E	Online	Changed
DBRO0026E	Online	Changed
DBRO0027E	Online	Changed
DBRO0028E	Online	Changed
DBRO0030E	Online	Changed
DBRO0031E	Online	Changed
DBRO0033E	Online	Changed
DBRO0034E	Online	New
DBRO0035E	Online	Changed

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DBRO0036E	Online	Changed
DBRO0037E	Online	Changed
DBRO0038E	Online	Changed
DBRO0039E	Online	Changed
DBRO00040	Online	No Longer Supported
DBRO0041E	Online	Changed
DBRO0042E	Online	New
DBRO0043E	Online	Changed
DBRO0044E	Online	Changed
DBRO0045E	Online	Changed
DBRO0046E	Online	Changed
DBRO0047E	Online	Changed
DBRO0048E	Online	Changed
DBRO0049E	Online	Changed
DBRO0050E	Online	Changed
DBRO0051E	Online	Changed
DBRO0052E	Online	Changed
DBRO0053E	Online	Changed
DBRO0054E	Online	Changed
DBRO0055E	Online	Changed
DBRO0056E	Online	Changed
DBRO0057E	Online	New
DBRO0060E	Online	Changed
DBRO0061E	Online	Changed
DBRO00062	Online	No Longer Supported
DBRO0063E	Online	Changed
DBRO0064E	Online	Changed
DBRO0070E	Online	Changed
DBRO0071E	Online	Changed
DBRO0072E	Online	Changed
DBRO0073E	Online	Changed
DBRO0074E	Online	Changed
DBRO0075E	Online	Changed
DBRO0076E	Online	Changed
DBRO0080I	Online	Changed
DBRO0081I	Online	Changed
DBRO0083I	Online	Changed
DBRO0085A	Online	Changed
DBRO0086A	Online	Changed

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DBRO0090T	Online	Changed
DBRO0091E	Online	Changed
DBRO0092T	Online	New
DBRO0093T	Online	New
DBRO0094E	Online	New
DBRO0095E	Online	New
DBRO0096E	Online	New
DBRO0097E	Online	New
DBRO0098E	Online	New
DBRO0099E	Online	New
DBSO0001I	Online	New
DEAT0001I	Online	New
DEAT0004E	Online	New
DEAT0005E	Online	New
DECD0001I	Online	New
DECD0002I	Online	New
DECD0003I	Online	New
DECD0004E	Online	New
DECD0005E	Online	New
DECD0006E	Online	New
DECD0007E	Online	New
DECD0008E	Online	New
DECD0009E	Online	New
DFIL0010I	Online	Changed
DFPC0002T	Online	New
DFPC0003I	Online	New
DFPC0004I	Online	New
DFPC0005W	Online	New
DFPC0006W	Online	New
DFPC0007T	Online	New
DFPC0008T	Online	New
DFPC0009T	Online	New
DIGIT NON-NUMERIC	Online	No Longer Supported
DIGITS MISSING	Online	No Longer Supported
DISPLACEMENT NOT ON A HALF WORD...	Offline	No Longer Supported
DKAT0003E	Online	Changed
DKAT0004E	Online	No Longer Supported
DKAT0005E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DKAT0006E	Online	New
DMF50042	Online	Changed
DPAT0001I	Online	New
DPAT0002I	Online	New
DPAT0003I	Online	New
DPAT0013E	Online	New
DPAT0014E	Online	New
DPGM0010I	Online	Changed
DRCT0001I	Online	New
DRCT0002E	Online	New
DRCT0003E	Online	New
DRCT0004E	Online	New
DRCT0005E	Online	New
DRCT0006E	Online	New
DRCT0007E	Online	New
DRCT0010I	Online	New
DRD40067E	Online	New
DRD40068E	Online	New
DRD50051E	Online	No Longer Supported
DRD50052E	Online	No Longer Supported
DRD50053E	Online	No Longer Supported
DRD50054E	Online	No Longer Supported
DRD50055E	Online	No Longer Supported
DRD50057E	Online	No Longer Supported
DRD50058E	Online	No Longer Supported
DRD50059E	Online	No Longer Supported
DRD50060E	Online	No Longer Supported
DRD50063E	Online	New
DRD50064E	Online	New
DREC0010I	Online	New
DREC0020I	Online	New
DRIVER PROGRAM ALREADY LOADED...	Offline	No Longer Supported
DSER0001I	Online	New
DSER0002I	Online	New
DSER0042E	Online	New
DSMG0000I	Online	No Longer Supported
DSMG0001I	Online	New
DSMG0008I	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DSMG0011I	Online	No Longer Supported
DSMG0037E	Online	New
DSMG0039E	Online	New
DSMG0040E	Online	New
DSMG0041E	Online	New
DSMG0042E	Online	New
DSMG0058E	Online	New
DSMG0059E	Online	New
DSMG0061E	Online	No Longer Supported
DSMG0063E	Online	New
DSMG0100I	Online	New
DSMG0104I	Online	New
DSMG0108I	Online	New
DSMG0111I	Online	New
DSMG0112I	Online	New
DSMG0153E	Online	New
DSMG0157E	Online	New
DSMG0172E	Online	New
DSPT	Online	No Longer Supported
DUMP0000I	Online	New
DUMP0009E	Online	New
DURT	Online	No Longer Supported
DYDD0001I	Online	Changed
DYDD0002I	Online	Changed
DYDD0003I	Online	Changed
DYDD0004T	Online	Changed
DYDD0005T	Online	New
DYDK – FACE ERR, JOB ABORTED	Online	No Longer Supported
DYDK – I/O ERR, JOB ABORTED	Online	No Longer Supported
DYOPM BASE ORDINAL NUMBER <i>nnn</i> IS TOO LARGE...	Online	No Longer Supported
DYOPM DIRECTORY NUMBER <i>nnnn</i> IS TOO LARGE...	Online	No Longer Supported
DYOPM INPUT RCP TAPE IS IN 3.1 FORMAT	Offline	No Longer Supported
DYOPM INTERVENTION PARAMETERS...	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DYOPM NUMBER OF DIRECTORIES...	Offline	No Longer Supported
DYOPM OLD FORMAT TAPES ARE NOT SUPPORTED...	Offline	No Longer Supported
ECBL0013I	Online	New
END OF DATA BEFORE END CARD...	Offline	No Longer Supported
ERROR IN FILING PROGRAM	Online	No Longer Supported
ERROR IN FILING TABLE	Online	No Longer Supported
ERROR IN LINKING – DUMP FOLLOWS	Offline	No Longer Supported
ERROR IN LINKING – NOTIFY SUPPORT	Offline	No Longer Supported
ERROR IN NAME TABLE – NOTIFY SUPPORT	Offline	No Longer Supported
ERROR IN TAPE READ	Online	No Longer Supported
ERROR ON RETURN FROM FSTIC	Online	No Longer Supported
EQUATE PROGRAM NOT PREVIOUSLY IN TABLE	Offline	No Longer Supported
FALLBACK STATUS	Online	No Longer Supported
FCAP00002	Online	No Longer Supported
FCAP00007	Online	Changed
FCAP00011	Online	Changed
FCAP00064	Online	Changed
FCAP00111	Online	Changed
FCAP00115	Online	No Longer Supported
FCAP0117E	Online	New
FCAP0119I	Online	New
FCAP0120I	Online	New
FCAP0128E	Online	New
FCAP0129E	Online	New
FCAP0153I	Online	New
FCAP0154E	Online	New
FCAP0155I	Online	New
FCAP0156E	Online	New
FCAP0157E	Online	New
FCAP0158E	Online	New
FCAP0159W	Online	New
FCAP0160E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
FCAP0161E	Online	New
FCAP0162W	Online	New
FCBI	Online	No Longer Supported
FCTB0001T	Offline	New
FCTB0002T	Offline	New
FCTB0003E	Offline	New
FCTB0004E	Offline	New
FCTB0005W	Offline	New
FCTB0005T	Offline	New
FCTB0007T	Offline	New
FCTB0008E	Offline	New
FCTB0009W	Offline	New
FCTB0010E	Offline	New
FCTB0011E	Offline	New
FCTB0012W	Offline	New
FCTB0013E	Offline	New
FCTB0015E	Offline	New
FCTB0016W	Offline	New
FCTB0018W	Offline	New
FCTB0019E	Offline	New
FCTB0020W	Offline	New
FCTB0021W	Offline	New
FCTB0022E	Offline	New
FCTB0023E	Offline	New
FCTB0024E	Offline	New
FCTB0025W	Offline	New
FCTB0026W	Offline	New
FCTB0027W	Offline	New
FCTB0028W	Offline	New
FCTB0029E	Offline	New
FCTB0030I	Offline	New
FCTB0031E	Offline	New
FCTB0032E	Offline	New
FCTB0035E	Offline	New
FCTB0036W	Offline	New
FCTB0037E	Offline	New
FCTB0038E	Offline	New
FCTB0039E	Offline	New
FCTB0040W	Offline	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
FCTB0041E	Offline	New
FCTB0042E	Offline	New
FCTB0043W	Offline	New
FCTB0044E	Offline	New
FCTB0045I	Offline	New
FCTB0046E	Offline	New
FCTB0047E	Offline	New
FCTB0048E	Offline	New
FCTB0049E	Offline	New
FCTB0050I	Offline	New
FCTB0051E	Offline	New
FCTB0052E	Offline	New
FCTB0053E	Offline	New
FCTB0054W	Offline	New
FCTB0055W	Offline	New
FCTB0056E	Offline	New
FCTB0057E	Offline	New
FCTB0058W	Offline	New
FCTB0059I	Offline	New
FCTB0061E	Offline	New
FCTB0062W	Offline	New
FCTB0063E	Offline	New
FCTB0064W	Offline	New
FCTB0065E	Offline	New
FCTB0066E	Offline	New
FCTB0067E	Offline	New
FCTB0068E	Offline	New
FCTB0069E	Offline	New
FCTB0070E	Offline	New
FCTB0071W	Offline	New
FCTB0072W	Offline	New
FCTB0073E	Offline	New
FCTB0074E	Offline	New
FCTB0075E	Offline	New
FCTB0076W	Offline	New
FCTB0077E	Offline	New
FCTB0078E	Offline	New
FCTB0079E	Offline	New
FCTB0080E	Offline	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
FCTB0081E	Offline	New
FCTB0082E	Offline	New
FCTB0083E	Offline	New
FCTB0084E	Offline	New
FCTB0085E	Offline	New
FCTB0086E	Offline	New
FCTB0087E	Offline	New
FCTB0088E	Offline	New
FCTB0089E	Offline	New
FCTB0090E	Offline	New
FCTB0091E	Offline	New
FCTB0092E	Offline	New
FCTB0093E	Offline	New
FCTB00093W	Offline	Changed
FCTB0094E	Offline	New
FCTB0095E	Offline	New
FCTB0096E	Offline	New
FCTB0097W	Offline	New
FCTB0098W	Offline	New
FCTB0099W	Offline	New
FCTB0100W	Offline	New
FCTB0101E	Offline	New
FCTB0106I	Offline	New
FCTB0999T	Offline	New
FDNT0023E	Online	No Longer Supported
FDNT0027E	Online	New
FKPA0002A	Online	No Longer Supported
FKPA0003E	Online	No Longer Supported
FKPA0003W	Online	No Longer Supported
FKPA0006W	Online	No Longer Supported
FKPA00041	Online	New
FKPA0005E	Online	New
FKPA0007A	Online	New
FKPA0008A	Online	New
FKPA0009A	Online	New
FKPA0010I	Online	New
FMNT0022A	Online	Changed
FMNT0027E	Online	New
FMNT0028E	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
FMSG0001I	Online	New
FMSG0002I	Online	New
FMSG0003I	Online	New
FMSG0004I	Online	New
FMSG0005I	Online	New
FMSG0006I	Online	New
FMSG0007I	Online	New
FMSG0008I	Online	New
FMSG0009I	Online	New
FMSG0010I	Online	New
FMSG0011I	Online	New
FMSG0012I	Online	New
FMSG0013I	Online	New
FMSG0014I	Online	New
FMSG0015I	Online	New
FMSG0016I	Online	New
FMSG0017I	Online	New
FMSG0018I	Online	New
FMSG0019I	Online	New
FRST0002I	Online	New
FRST00007	Online	Changed
FRST00011	Online	Changed
FRST0035E	Online	No Longer Supported
FRST0061E	Online	New
FRST0062E	Online	New
FRST0064E	Online	No Longer Supported
FRST0068I	Online	New
FRST00082	Online	Changed
FRST0092I	Online	New
FRST0111A	Online	No Longer Supported
FRST0115I	Online	No Longer Supported
FRST0116I	Online	No Longer Supported
FRST0136I	Online	No Longer Supported
FRST0147E	Online	New
FRST0150E	Online	No Longer Supported
FRST0151E	Online	No Longer Supported
FRST0161E	Online	New
GAFI0001I	Online	New
GAFI0002T	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
GAFI0003T	Online	New
GAFI0004T	Online	New
GAFI0005T	Online	New
GAFI0006T	Online	New
GAFI0007T	Online	New
GEN001	Online	No Longer Supported
GEN002	Online	No Longer Supported
GEN005	Online	No Longer Supported
GEN006	Online	No Longer Supported
GEN007	Online	No Longer Supported
GEN008	Online	No Longer Supported
GEN009	Online	No Longer Supported
GEN010	Online	No Longer Supported
GEN011	Online	No Longer Supported
GEN013	Online	No Longer Supported
GEN014	Online	No Longer Supported
GEN016	Online	No Longer Supported
GEN017	Online	No Longer Supported
GEN018	Online	No Longer Supported
GEN023	Online	No Longer Supported
GEN024	Online	No Longer Supported
GEN026	Online	No Longer Supported
GEN028	Online	No Longer Supported
GEN029	Online	No Longer Supported
GEN030	Online	No Longer Supported
GEN032	Online	No Longer Supported
GEN033	Online	No Longer Supported
GEN034	Online	No Longer Supported
GEN035	Online	No Longer Supported
GEN037	Online	No Longer Supported
GEN039	Online	No Longer Supported
GEN051	Online	No Longer Supported
GEN053	Online	No Longer Supported
GEN054	Online	No Longer Supported
GEN055	Online	No Longer Supported
GEN056	Online	No Longer Supported
GEN059	Online	No Longer Supported
GEN062	Online	No Longer Supported
GEN063	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
GEN065	Online	No Longer Supported
GEN066	Online	No Longer Supported
GEN067	Online	No Longer Supported
GEN068	Online	No Longer Supported
GEN069	Online	No Longer Supported
GEN071	Online	No Longer Supported
GEN072	Online	No Longer Supported
GEN073	Online	No Longer Supported
GEN074	Online	No Longer Supported
GEN075	Online	No Longer Supported
GEN076	Online	No Longer Supported
GEN077	Online	No Longer Supported
GEN078	Online	No Longer Supported
GEN079	Online	No Longer Supported
GEN080	Online	No Longer Supported
GEN081	Online	No Longer Supported
GEN082	Online	No Longer Supported
GEN083	Online	No Longer Supported
GEN084	Online	No Longer Supported
GEN086	Online	No Longer Supported
GEN089	Online	No Longer Supported
GEN090	Online	No Longer Supported
GEN102	Online	No Longer Supported
GEN106	Online	No Longer Supported
GEN107	Online	No Longer Supported
GEN109	Online	No Longer Supported
GEN110	Online	No Longer Supported
GEN118	Online	No Longer Supported
GEN124	Online	No Longer Supported
GEN125	Online	No Longer Supported
GEN128	Online	No Longer Supported
GEN129	Online	No Longer Supported
GEN130	Online	No Longer Supported
GEN131	Online	No Longer Supported
GEN132	Online	No Longer Supported
GEN133	Online	No Longer Supported
GEN134	Online	No Longer Supported
GEN135	Online	No Longer Supported
GEN137	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
GEN138	Online	No Longer Supported
GEN139	Online	No Longer Supported
GEN142	Online	No Longer Supported
GEN143	Online	No Longer Supported
GEN149	Online	No Longer Supported
GEN150	Online	No Longer Supported
GEN151	Online	No Longer Supported
GEN152	Online	No Longer Supported
GEN154	Online	No Longer Supported
GEN158	Online	No Longer Supported
GEN159	Online	No Longer Supported
GEN161	Online	No Longer Supported
GEN162	Online	No Longer Supported
GEN163	Online	No Longer Supported
GEN164	Online	No Longer Supported
GEN167	Online	No Longer Supported
GEN168	Online	No Longer Supported
GEN169	Online	No Longer Supported
GEN171	Online	No Longer Supported
GEN173	Online	No Longer Supported
GEN174	Online	No Longer Supported
GEN175	Online	No Longer Supported
GEN179	Online	No Longer Supported
GEN182	Online	No Longer Supported
GEN185	Online	No Longer Supported
GEN186	Online	No Longer Supported
GEN187	Online	No Longer Supported
GEN188	Online	No Longer Supported
GEN190	Online	No Longer Supported
GEN197	Online	No Longer Supported
GEN198	Online	No Longer Supported
GEN199	Online	No Longer Supported
GEN250	Online	No Longer Supported
GEN255	Online	No Longer Supported
GEN256	Online	No Longer Supported
GEN257	Online	No Longer Supported
GEN258	Online	No Longer Supported
GEN259	Online	No Longer Supported
GEN260	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
GEN261	Online	No Longer Supported
GEN262	Online	No Longer Supported
GEN263	Online	No Longer Supported
GOGO0010E	Online	No Longer Supported
GOGO0021E	Online	New
GOGO0022E	Online	New
HASH VALUE MUST BE ODD...	Online	No Longer Supported
IDOT0001I	Online	New
IDOT0002I	Online	New
IDOT0003I	Online	New
IDOT0004I	Online	New
IDOT0005I	Online	New
IDOT0006I	Online	New
IDOT0007I	Online	New
IDOT0011I	Online	New
IDOT0012I	Online	New
IDOT0013I	Online	New
IDOT0014I	Online	New
IDOT0015I	Online	New
IDOT0016I	Online	New
IDOT0017I	Online	New
IDOT0020I	Online	New
IDOT0021I	Online	New
IDOT0040E	Online	New
IDOT0041E	Online	New
IDOT0042E	Online	New
IDOT0043E	Online	New
IDOT0044E	Online	New
IDOT0045E	Online	New
IDOT0046E	Online	New
IDOT0047E	Online	New
IDOT0048E	Online	New
IDOT0049E	Online	New
IDOT0050E	Online	New
IDOT0051E	Online	New
IDOT0052E	Online	New
IDOT0053E	Online	New
IDOT0054E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
IDOT0055E	Online	New
IDOT0056E	Online	New
IDOT0057E	Online	New
IDOT0058E	Online	New
IDOT0059E	Online	New
IDOT0060E	Online	New
IDOT0061E	Online	New
IDOT0062E	Online	New
IDOT0063E	Online	New
IDOT0064E	Online	New
IDOT0065E	Online	New
IDOT0066E	Online	New
IDOT0067E	Online	New
IDOT0068E	Online	New
IDOT0069E	Online	New
IDOT0070E	Online	New
IDOT0071E	Online	New
IDOT0072E	Online	New
IDOT0073E	Online	New
IDOT0074E	Online	New
IDOT0075W	Online	New
IDOT0076E	Online	New
IDOT0077E	Online	New
IDOT0078W	Online	New
ILLEGAL CARD IN OBJECT MODULE...	Offline	No Longer Supported
IMAG0001I	Online	New
IMAG0002I	Online	New
IMAG0003I	Online	New
IMAG0004I	Online	New
IMAG0005I	Online	New
IMAG0006I	Online	New
IMAG0007I	Online	New
IMAG0008I	Online	New
IMAG0009I	Online	New
IMAG0011I	Online	New
IMAG0012I	Online	New
IMAG0013I	Online	New
IMAG0014I	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
IMAG0015I	Online	New
IMAG0016I	Online	New
IMAG0017I	Online	New
IMAG0018I	Online	New
IMAG0019I	Online	New
IMAG0020I	Online	New
IMAG0021I	Online	New
IMAG0022I	Online	New
IMAG0025I	Online	New
IMAG0026I	Online	New
IMAG0027I	Online	New
IMAG0028I	Online	New
IMAG0029I	Online	New
IMAG0050E	Online	New
IMAG0052E	Online	New
IMAG0053E	Online	New
IMAG0054E	Online	New
IMAG0055E	Online	New
IMAG0056E	Online	New
IMAG0057E	Online	New
IMAG0058E	Online	New
IMAG0059E	Online	New
IMAG0072E	Online	New
IMAG0073E	Online	New
IMAG0074E	Online	New
IMAG0075E	Online	New
IMAG0076W	Online	New
IMAG0077E	Online	New
IMAG0078E	Online	New
IMAG0101E	Online	New
IMAG0102E	Online	New
IMAG0103E	Online	New
IMAG0104E	Online	New
IMAG0105E	Online	New
IMAG0106E	Online	New
IMAG0107E	Online	New
IMAG0108E	Online	New
IMAG0109E	Online	New
IMAG0110E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
IMAG0111E	Online	New
IMAG0112E	Online	New
IMAG0113E	Online	New
IMAG0114E	Online	New
IMAG0115E	Online	New
IMAG0116E	Online	New
IMAG0117W	Online	New
IMAG0118W	Online	New
IMAG0119E	Online	New
IMAG0120W	Online	New
IMAG0121E	Online	New
IMAG0122W	Online	New
IMAG0123W	Online	New
IMAG0124E	Online	New
IMAG0125E	Online	New
IMAG0126E	Online	New
IMAG0127E	Online	New
IMAG0128E	Online	New
IMAG0129E	Online	New
IMAG0130E	Online	New
IMAG0131E	Online	New
IMAG0132E	Online	New
IMAG0133E	Online	New
IMAG0134E	Online	New
IMAG0135E	Online	New
IMAG0136E	Online	New
IMAG0137E	Online	New
IMAG0138E	Online	New
IMAG0139E	Online	New
IMAG0140E	Online	New
IMAG0141E	Online	New
IMAG0142E	Online	New
IMAG0143E	Online	New
IMAG0144E	Online	New
IMAG0145E	Online	New
IMAG0146E	Online	New
IMAG0147E	Online	New
IMAG0148E	Online	New
IMAG0149E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
IMAG0150E	Online	New
IMAG0151E	Online	New
IMAG0152E	Online	New
IMAG0153E	Online	New
IMAG0154E	Online	New
IMAG0155E	Online	New
IMAG0156E	Online	New
IMAG0157E	Online	New
IMAG0158E	Online	New
IMAG0159E	Online	New
IMAG0160E	Online	New
IMAG0161E	Online	New
IMAG0165E	Online	New
IMAG0166E	Online	New
IMAG0167E	Online	New
IMAG0168E	Online	New
IMAG0169E	Online	New
IMAG0170E	Online	New
IMAG0171E	Online	New
IMAG0172E	Online	New
IMAG0173E	Online	New
IMAG0175E	Online	New
IMAG0176E	Online	New
IMAG0177W	Online	New
IMPROPER FIELD DELIMITER	Offline	No Longer Supported
INCORRECT LENGTH IN PROGRAM ID FIELD	Offline	No Longer Supported
INTERNAL FACE TBL ERROR HAS OCCURRED...	Offline	No Longer Supported
INVALID CALL/LINK PARAMETERS...	Offline	No Longer Supported
INVALID DELIMITER ON REP CARD	Offline	No Longer Supported
INVALID HEX CHARACTER IN ADDRESS	Offline	No Longer Supported
INVALID HEXADECIMAL INFORMATION...	Offline	No Longer Supported
INVALID INPUT CARD OR PROGRAM TYPE	Offline	No Longer Supported
INVALID MESSAGE FORMAT	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
INVALID OPTION	Online	No Longer Supported
INVALID RECORD TYPE SUPPLIED BY PAL	Offline	No Longer Supported
INVALID REQUEST	Online	No Longer Supported
INVALID RETURN CODE FROM LEDT...	Offline	New
I/O ERROR DURING DIRECTORY SEARCH...	Offline	No Longer Supported
I/O ERROR HAS OCCURRED...	Offline	No Longer Supported
I/O ERROR OCCURRED – DUMP FOLLOWS	Offline	No Longer Supported
I/O ERROR OCCURRED – NOTIFY SUPPORT	Offline	No Longer Supported
IPLA0050E	Online	Changed
IPLA0051T	Online	Changed
IPLB0011E	Online	Changed
IPLB0014W	Online	New
IPLB0015A	Online	New
IPLB0016I	Online	New
IPLB0017E	Online	New
IPLB0047A	Online	No Longer Supported
IPLB0063W	Online	New
IPLB0078T	Online	New
IPLB0078W	Online	No Longer Supported
IPLB0082E	Online	No Longer Supported
IPLB0083E	Online	No Longer Supported
IPLB0084E	Online	No Longer Supported
IPLB0084W	Online	No Longer Supported
IPLB0086E	Online	Changed
IPLB0121E	Online	New
IPLB0121W	Online	New
IPLB0130I	Online	New
IPLB0147A	Online	New
IPLB0150I	Online	New
IPLB0151I	Online	New
IPLB0154A	Online	New
IPLB0155T	Online	New
IPLB0156T	Online	New
IPLB0157A	Online	New
IPLB00A8T	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
JCD30096T	Online	No Longer Supported
JCD30097I	Online	No Longer Supported
JCD30098I	Online	No Longer Supported
JCD30098T	Online	No Longer Supported
JCD30099I	Online	No Longer Supported
JCD30100W	Online	No Longer Supported
JCD30101W	Online	No Longer Supported
JCD30102W	Online	No Longer Supported
JCD30103E	Online	No Longer Supported
JCD30104E	Online	No Longer Supported
JCD30105E	Online	No Longer Supported
JCD30107E	Online	No Longer Supported
JCD30112E	Online	No Longer Supported
JCD30113E	Online	No Longer Supported
JCD30114E	Online	No Longer Supported
JCD30115E	Online	No Longer Supported
JCD30118E	Online	No Longer Supported
JCD30119E	Online	No Longer Supported
JCD TAPE RECORD xxx HAS...	Offline	No Longer Supported
JCD TAPE RECORD xxx IS OUT...	Offline	No Longer Supported
LACL0001E	Online	New
LACL0002E	Online	New
LACL0003E	Online	New
LACL0004E	Online	New
LASN	Online	No Longer Supported
LATO	Online	No Longer Supported
LDLS	Online	No Longer Supported
LDPT	Online	No Longer Supported
LDRS	Online	No Longer Supported
LDTE	Online	No Longer Supported
LDTI	Online	No Longer Supported
LHUB	Online	No Longer Supported
LIDL	Online	No Longer Supported
LM2740	Online	No Longer Supported
LOAD MAY BE INCOMPLETE...	Offline	No Longer Supported
LOAD OF PROGRAM xxxx NOT ALLOWED	Offline	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
LOAD STATUS	Online	No Longer Supported
LOADER PROCESSING ANOTHER REQUEST...	Online	No Longer Supported
LREP	Online	No Longer Supported
LRES	Online	No Longer Supported
LROL	Online	No Longer Supported
LRST	Online	No Longer Supported
LSOF00	Online	No Longer Supported
LSOF30	Online	No Longer Supported
LSOF40	Online	No Longer Supported
LSOF60	Online	No Longer Supported
LSOF70	Online	No Longer Supported
LSOF80	Online	No Longer Supported
LSON00	Online	No Longer Supported
LSON30	Online	No Longer Supported
LSON40	Online	No Longer Supported
LSON50	Online	No Longer Supported
LSON60	Online	No Longer Supported
LSON70	Online	No Longer Supported
LSON80	Online	No Longer Supported
LSTA	Online	No Longer Supported
LSTP	Online	No Longer Supported
LTDF	Online	No Longer Supported
LTOF01I	Online	No Longer Supported
LTON	Online	No Longer Supported
LTON01I	Online	No Longer Supported
LUCS	Online	No Longer Supported
MCHR xxxxxxxx DUP LARGE	Online	No Longer supported
MCHR0001I	Online	New
MCHR0050E	Online	New
MCHR0052E	Online	New
MCHR SON MUST BE...	Online	No Longer Supported
MCPY0044T	Online	No Longer Supported
MCPY0101T	Online	New
MEAS0001I	Online	New
MEAS0002I	Online	New
MEAS0003I	Online	New
MEAS0004I	Online	New
MEAS0005I	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MEAS0006I	Online	New
MEAS0007I	Online	New
MEAS0008I	Online	New
MEAS0009E	Online	New
MEAS0010E	Online	New
MEAS0011E	Online	New
MEAS0012E	Online	New
MEAS0013E	Online	New
MEAS0014I	Online	New
MEAS0015I	Online	New
MEAS0016I	Online	New
MEAS0017I	Online	New
MEAS0018E	Online	New
MEAS0019E	Online	New
MEAS0020E	Online	New
MEAS0021E	Online	New
MEAS0022E	Online	New
MEAS0023E	Online	New
MEAS0024E	Online	New
MEAS0027E	Online	New
MEAS0028I	Online	New
MISSING CEND CARD WAS ASSUMED...	Offline	No Longer Supported
MODE0001E	Online	New
MODE0001I	Online	New
MODE0002E	Online	New
MODE0002I	Online	New
MODE0004I	Online	New
MODULE DOWN, PRIME/DUP...	Online	No Longer Supported
NALS0001I	Online	Changed
NALS0052E	Online	New
NCCB0002E	Online	No Longer Supported
NCCB0003E	Online	No Longer Supported
NCCB0004E	Online	No Longer Supported
NCCB0008I	Online	New
NCCB0026I	Online	Changed
NCCB0027W	Online	Changed
NCCB0041E	Online	New
NCNS0001I	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NCNS0002I	Online	New
NCNS0003I	Online	New
NCNS0004E	Online	New
NCNS0005E	Online	New
NCNS0006E	Online	New
NCNS0007E	Online	New
NCNS0008E	Online	New
NCNS0009E	Online	New
NCNS0011E	Online	New
NCNS0012E	Online	New
NCNS0013E	Online	New
NCNS0014E	Online	New
NCNS0015E	Online	New
NCNS0016E	Online	New
NCNS0017E	Online	New
NCNS0018E	Online	New
NCNS0019E	Online	New
NCNS0020E	Online	New
NCNS0021E	Online	New
NCNS0022E	Online	New
NCNS0023E	Online	New
NCNS0024E	Online	New
NCNS0025E	Online	New
NCNS0026E	Online	New
NCNS0038E	Online	New
NCNS0039E	Online	New
NCNS0040E	Online	New
NCNS0041E	Online	New
NCNS0042E	Online	New
NCNS0046I	Online	New
NCNS0047I	Online	New
NCNS0048I	Online	New
NCNS0056E	Online	New
NCVT0001I	Online	Changed
NCVT0007E	Online	New
NDLU0001I	Online	No Longer Supported
NDLU0002I	Online	No Longer Supported
NDLU0003I	Online	No Longer Supported
NDLU0005I	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NDLU0010E	Online	No Longer Supported
NDLU0011E	Online	No Longer Supported
NDLU0011I	Online	New
NDLU0012E	Online	No Longer Supported
NDLU0012I	Online	New
NDLU0013E	Online	No Longer Supported
NDLU0013I	Online	New
NDLU0014E	Online	No Longer Supported
NDLU0014I	Online	New
NDLU0015E	Online	No Longer Supported
NDLU0016E	Online	New
NDLU0017E	Online	New
NDLU0018E	Online	New
NDLU0019E	Online	New
NDLU0020E	Online	New
NDLU0021E	Online	New
NDLU0022E	Online	New
NDLU0023E	Online	New
NDLU0024E	Online	New
NDLU0025E	Online	New
NDLU0026E	Online	New
NDLU0027E	Online	New
NDLU0028E	Online	New
NDLU0030E	Online	New
NETW0003E	Online	Changed
NETW0004E	Online	Changed
NETW0008E	Online	Changed
NETW0013E	Online	Changed
NETW0015E	Online	No Longer Supported
NETW0016E	Online	No Longer Supported
NETW0017E	Online	No Longer Supported
NETW0018E	Online	No Longer Supported
NETW0026I	Online	No Longer Supported
NETW0030E	Online	Changed
NETW0031E	Online	Changed
NETW0032E	Online	New
NETW0033I	Online	New
NETW0034E	Online	New
NETW0042E	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NETW0043E	Online	Changed
NETW0044E	Online	No Longer Supported
NETW0048E	Online	No Longer Supported
NETW0051E	Online	No Longer Supported
NETW0053I	Online	New
NETW0054I	Online	New
NETW0055E	Online	New
NETW0056E	Online	New
NETW0057E	Online	New
NETW0058E	Online	New
NETW0059E	Online	New
NET00060I	Online	Changed
NETW0061E	Online	Changed
NET00063E	Online	No Longer Supported
NET00065E	Online	No Longer Supported
NETW0069I	Online	New
NLM00001I	Online	New
NLM00004E	Online	New
NLM00010E	Online	New
NLM00011E	Online	New
NLM00012E	Online	New
NMON0001I	Online	Changed
NMON0002E	Online	No Longer Supported
NMON0003E	Online	No Longer Supported
NMON0005I	Online	No Longer Supported
NMON0006E	Online	New
NMOR0050E	Online	No Longer Supported
NNCB0002E	Online	No Longer Supported
NNCB0011I	Online	No Longer Supported
NNCB0014E	Online	New
NNCB0016I	Online	New
NNCB0051E	Online	New
NNCS0000I	Online	Changed
NNCS0016E	Online	New
NO ADDRESS AVAILABLE FOR REQUESTED MEDIA	Offline	No Longer Supported
NO CORE FOR SAL TABLE...	Offline	No Longer Supported
NO ENTRIES EXIST FOR THIS OLD TAPE	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NO MORE THAN 25 PROGRAMS...	Online	No Longer Supported
NO ROOM IN CORE TO CONTAIN THIS PROGRAM	Offline	No Longer Supported
NOPL0001I	Online	New
NOPL0002I	Online	New
NOPL0030E	Online	New
NOPL0031E	Online	New
NOPL0032E	Online	New
NOPL0033E	Online	New
NOPL0034E	Online	New
NOPL0035E	Online	New
NOPL0036E	Online	New
NOPL0037W	Online	New
NOPL0039E	Online	New
NOPL0040E	Online	New
NOPL0041E	Online	New
NOPL0042E	Online	New
NOPL0043E	Online	New
NOPL0044E	Online	New
NOPL0045E	Online	New
NOPL0046E	Online	New
NOPL0047E	Online	New
NOPL0050E	Online	New
NOPL0060A	Online	New
NOPL0061A	Online	New
NOPL0062A	Online	New
NOPL0063A	Online	New
NOT ENOUGH CORE FOR SAL TABLE...	Offline	No Longer Supported
NOT LOADED – KYPT CONFIGURATION...	Offline	No Longer Supported
NOT LOADED – PGM CAN ONLY BE...	Offline	No Longer Supported
NOT LOADED – PGM SIZE...	Offline	No Longer Supported
NOT LOADED – PTV NOT GENERATED...	Offline	No Longer Supported
NPIU0001E	Online	No Longer Supported
NPIU0001I	Online	New
NPIU0002I	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NPIU0003E	Online	No Longer Supported
NPIU0003I	Online	New
NPIU0050E	Online	New
NPIU0051E	Online	New
NPIU0052E	Online	New
NPOL0002E	Online	No Longer Supported
NPOL0004E	Online	New
NPOL0009E	Online	New
NRVT0003E	Online	No Longer Supported
NRVT0006E	Online	New
NRVT0030I	Online	New
NRVT0031I	Online	New
NSCB0001I	Online	New
NSCB0002I	Online	New
NSCB0003I	Online	New
NSCB0010I	Online	New
NSCB0011I	Online	New
NSCB0016E	Online	New
NSCB0017E	Online	New
NSCB0018E	Online	New
NSCB0019E	Online	New
NSCB0020E	Online	New
NSID0001I	Online	New
NSID0002I	Online	New
NSID0003I	Online	New
NSID0004I	Online	New
NSID0005I	Online	New
NSID0006A	Online	New
NSID0007E	Online	New
NSID0008E	Online	New
NSID0009E	Online	New
NSID0010E	Online	New
NSID0011E	Online	New
NSID0012E	Online	New
NSID0013E	Online	New
NSID0014E	Online	New
NSID0015E	Online	New
NSID0016E	Online	New
NSID0017I	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NSID0018I	Online	New
NSID0019A	Online	New
NSID0021E	Online	New
NSID0022E	Online	New
NSID0023E	Online	New
NSID0024E	Online	New
NSID0025E	Online	New
NSID0026E	Online	New
NSID0027E	Online	New
NSID0028E	Online	New
NSID0029E	Online	New
NSID0030E	Online	New
NSID0031E	Online	New
NSID0032E	Online	New
NSID0033E	Online	New
NSID0034E	Online	New
NSID0035E	Online	New
NSID0036E	Online	New
NSID0037I	Online	New
NSID0038I	Online	New
NSPA0014E	Online	New
NSPA0017I	Online	New
NTRP0001I	Online	New
NTRP0002I	Online	New
NTRP0004I	Online	New
NTRP0005I	Online	New
NTRP0006I	Online	New
NTRP0007I	Online	New
NTRP0008I	Online	New
NTRP0009I	Online	New
NTRP0010I	Online	New
NTRP0040I	Online	New
NTRP0041I	Online	New
NTRP0042I	Online	New
NTRP0043I	Online	New
NTRP0044I	Online	New
NTRP0050E	Online	New
NTRP0051E	Online	New
NTRP0052E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NTRP0053E	Online	New
NTRP0054E	Online	New
NTRP0055E	Online	New
NTRP0056E	Online	New
NTRP0057E	Online	New
NTRP0058E	Online	New
NTRP0060E	Online	New
NTRP0068E	Online	New
NUMBER MISSING	Online	No Longer Supported
NUMBER OF EXTERN GREATER...	Offline	No Longer Supported
OBJECT MODULE NOT ALLOCATED...	Offline	No Longer Supported
OBJECT MODULE TOO LARGE...	Offline	No Longer Supported
OLD POLICING ACTIVE	Online	No Longer Supported
OLD POLICING COMPLETED	Online	No Longer Supported
OLD POLICING STARTED	Online	No Longer Supported
OLDR0001T	Offline	New
OLDR0002T	Offline	New
OLDR0003T	Offline	New
OLDR0004T	Offline	New
OLDR0005E	Offline	New
OLDR0005T	Offline	New
OLDR0006E	Offline	New
OLDR0006T	Offline	New
OLDR0007E	Offline	New
OLDR0007T	Offline	New
OLDR0008T	Offline	New
OLDR0009T	Offline	New
OLDR0010T	Offline	New
OLDR0011T	Offline	New
OLDR0012T	Offline	New
OLDR0013T	Offline	New
OLDR0014T	Offline	New
OLDR0015T	Offline	New
OLDR0016T	Offline	New
OLDR0017T	Offline	New
OLDR0018T	Offline	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OLDR0019T	Offline	New
OLDR0020E	Offline	New
OLDR0021E	Offline	New
OLDR0022E	Offline	New
OLDR0023E	Offline	New
OLDR0024E	Offline	New
OLDR0030E	Offline	New
OLDR0031E	Offline	New
OLDR0032E	Offline	New
OLDR0033E	Offline	New
OLDR0034E	Offline	New
OLDR0035E	Offline	New
OLDR0036E	Offline	New
OLDR0037E	Offline	New
OLDR0038E	Offline	New
OLDR0039E	Offline	New
OLDR0040W	Offline	New
OLDR0041W	Offline	New
OLDR0042E	Offline	New
OLDR0043E	Offline	New
OLDR0044E	Offline	New
OLDR0045E	Offline	New
OLDR0046E	Offline	New
OLDR0047W	Offline	New
OLDR0048W	Offline	New
OLDR0049E	Offline	New
OLDR0050W	Offline	New
OLDR0060E	Offline	New
OLDR0061E	Offline	New
OLDR0062E	Offline	New
OLDR0063E	Offline	New
OLDR0064E	Offline	New
OLDR0065E	Offline	New
OLDR0070W	Offline	New
OLDR0071E	Offline	New
OLDR0075I	Offline	New
OLDR0076E	Online	New
OLDR0099E	Offline	New
OLDR0099W	Offline	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OLDR0100E	Online	New
OLDR0101W	Online	New
OLDR0102E	Online	New
OLDR0103E	Online	New
OLDR0104E	Online	New
OLDR0110E	Online	New
OLDR0201T	Online	New
OLDR0202T	Online	New
OLDR0203T	Online	New
OLDR0204T	Online	New
OLDR0205T	Online	New
OLDR0206I	Online	New
OLDR0207T	Online	New
OLDR0208T	Online	New
OLDR0209T	Online	New
OLDR0210T	Online	New
OLDR0211E	Online	New
OLDR0212E	Online	New
OLDR0213I	Online	New
OLDR0500I	Online	New
OLDR0501E	Online	New
OLDR0502I	Online	New
OLDR0503E	Online	New
OLDR0504E	Online	New
OLDR0505E	Online	New
OLDR0506E	Online	New
OLDR0507E	Online	New
OLDR0901T	Online	New
OLDR0902T	Online	New
OLDR0903T	Online	New
OLDR0904T	Online	New
OLDR0905T	Online	New
OLDR0906T	Online	New
OLDR0910I	Online	New
OLDR0911A	Online	New
OLDR0912A	Online	New
OLDR0913A	Online	New
OLDR0914T	Online	New
OLDR1001T	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OLDR1011E	Online	New
OLDR1015E	Online	New
OLDR1016I	Online	New
OLDR1056E	Online	New
OLDR1057I	Online	New
OLDR1058I	Online	New
OLDR1059I	Online	New
OLDR1060E	Online	New
OLDR1061E	Online	New
OLDR1062E	Online	New
OLDR1063E	Online	New
OLDR1064W	Online	New
OLDR1065E	Online	New
OLDR1067W	Online	New
OLDR1068W	Online	New
OLDR1069I	Online	New
OLDR1200I	Online	New
OLDR1220I	Online	New
OLDR1221T	Online	New
OLDR1222I	Online	New
OLDR1223T	Online	New
OLDR1224I	Online	New
OLDR1240I	Online	New
OLDR1241T	Online	New
OLDR1242I	Online	New
OLDR1243T	Online	New
OLDR1300W	Online	New
OLDR1301W	Online	New
OLDR2001T	Online	New
OLDR2002T	Online	New
OLDR2003T	Online	New
OLDR2004T	Online	New
OLDR2005T	Online	New
OLDR2006T	Online	New
OLDR2007T	Online	New
OLDR2008T	Online	New
OLDR2009T	Online	New
OLDR2010T	Online	New
OLDR2011T	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OLDR2012T	Online	New
OLDR2013T	Online	New
OLDR2014W	Online	New
OLDR2015I	Online	New
OLDR2016T	Online	New
OLDR2017T	Online	New
OLDR2018T	Online	New
OLDR2019T	Online	New
OLDR2020T	Online	New
OLDR2021T	Online	New
OLDR2022T	Online	New
OLDR2023T	Online	New
OLDR2024T	Online	New
OLDR2025W	Online	New
OLDR2030I	Online	New
OLDR2031I	Online	New
OLDR2035I	Online	New
OLDR2036I	Online	New
OLDR2037I	Online	New
OLDR2038I	Online	New
OLDR2039I	Online	New
OLDR2040I	Online	New
OLDR2041I	Online	New
OLDR2042I	Online	New
OLDR2043I	Online	New
OLDR2044I	Online	New
OLDR2048I	Online	New
OLDR2049E	Online	New
OLDR3000I	Online	New
OLDR3001I	Online	New
OLDR3002T	Online	New
OLDR3003T	Online	New
OLDR3004T	Online	New
OLDR3005T	Online	New
OLDR3006T	Online	New
OLDR3007T	Online	New
OLDR3008W	Online	New
OLDR3009T	Online	New
OLDR3010W	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OLDR3011W	Online	New
OLDR3012T	Online	New
OLDR3013E	Online	New
OLDR3014W	Online	New
OLDR3200T	Online	New
OLDR3201T	Online	New
OLDR3202T	Online	New
OLDR3203T	Online	New
OLDR3204T	Online	New
OLDR3205T	Online	New
OLDR3206T	Online	New
OLDR3207T	Online	New
OLDR3208E	Online	New
OLDR3209E	Online	New
OLDR3210E	Online	New
OLDR3211E	Online	New
OLDR3212E	Online	New
OLDR3213E	Online	New
OLDR3214W	Online	New
OLDR3215T	Online	New
OLDR3216I	Online	New
OLDR3217E	Online	New
OLDR3218E	Online	New
OLDR3219W	Online	New
OLDR3220E	Online	New
OLDR3221E	Online	New
OLDR3222W	Online	New
OLDR3223T	Online	New
OLDR3224T	Online	New
OLDR3400T	Online	New
OLDR3401T	Online	New
OLDR3402T	Online	New
OLDR3403I	Online	New
OLDR3404I	Online	New
OLDR3402T	Online	New
OLDR3403I	Online	New
OLDR3404I	Online	New
OLDR4001E	Online	New
OLDR4002E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OLDR4003E	Online	New
OLDR4004E	Online	New
OLDR4005E	Online	New
OLDR4006E	Online	New
OLDR4010E	Online	New
OLDR4011E	Online	New
OLDR4023I	Online	New
OLDR4024I	Online	New
OLDR4025I	Online	New
OLDR4026I	Online	New
OLDR4027I	Online	New
OLDR4028I	Online	New
OLDR4029I	Online	New
OLDR4100I	Online	New
OLDR4101I	Online	New
OLDR4102W	Online	New
OLDR4103E	Online	New
OLDR4104E	Online	New
OLDR4105I	Online	New
OLDR4120E	Online	New
OLDR4121W	Online	New
OLDR4122E	Online	New
OLDR4123E	Online	New
OLDR4124E	Online	New
OLDR4125E	Online	New
OLDR4126E	Online	New
OLDR4127E	Online	New
OLDR4128E	Online	New
OLDR4129E	Online	New
OLDR4130W	Online	New
OLDR4131W	Online	New
OLDR4132W	Online	New
OLDR4133W	Online	New
OLDR4134W	Online	New
OLDR4135W	Online	New
OLDR4136E	Online	New
OLDR4137E	Online	New
OLDR4138E	Online	New
OLDR4139E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OLDR5000E	Online	New
OLDR5001I	Online	New
OLDR5002E	Online	New
OLDR5003E	Online	New
OLDR5005I	Online	New
OLDR5006I	Online	New
OLDR5007I	Online	New
OLDR5100E	Online	New
OLDR5101I	Online	New
OLDR5200T	Online	New
OLDR5201T	Online	New
OLDR5202T	Online	New
OLDR5203T	Online	New
OLDR5204T	Online	New
OLDR5205E	Online	New
OLDR5206T	Online	New
OLDR5207I	Online	New
OLDR5250T	Online	New
OLDR5251T	Online	New
OLDR5252I	Online	New
OLDR5300I	Online	New
OLDR5301E	Online	New
OLDR5800T	Online	New
OLDR5801T	Online	New
OLDR5802T	Online	New
OLDR5803T	Online	New
OLDR5804T	Online	New
OLDR5805T	Online	New
OLDR5806T	Online	New
OLDR5807T	Online	New
OLDR5808T	Online	New
OLDR5809W	Online	New
OLDR5810T	Online	New
OLDR5811T	Online	New
OLDR5812I	Online	New
OLDR5813I	Online	New
OLDR5814T	Online	New
OLDR5815T	Online	New
OLDR5816T	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OLDR5817T	Online	New
OLDR5818T	Online	New
OLDR5819T	Online	New
OLDR5820T	Online	New
OLD TAPE DIRECTORY RECORD IS INVALID	Online	No Longer Supported
PAGE0050I	Online	New
PGM LENGTH GT ALLOCATION...	Offline	No Longer Supported
PGM xxxxxx NOT FOUND...	Offline	No Longer Supported
PIUP0051E	Offline	New
PIUP0052E	Offline	New
PIUP0053E	Offline	New
PIUP0054E	Offline	New
PIUP0055E	Offline	New
PIUP0056E	Offline	New
PIUP0057E	Offline	New
PIUP0058E	Offline	New
PIUP0059E	Offline	New
PIUP0060E	Offline	New
PIUT0001I	Online	No Longer Supported
PIUT0002I	Online	No Longer Supported
PIUT0005I	Online	No Longer Supported
PIUT0006I	Online	No Longer Supported
PIUT0053E	Online	No Longer Supported
PIUT0054E	Online	No Longer Supported
PIUT0057E	Online	No Longer Supported
PIUT0058E	Online	No Longer Supported
POOL0000	Online	No Longer Supported
POOL0001	Online	No Longer Supported
POOL0002	Online	No Longer Supported
POOL0003	Online	No Longer Supported
POOL0052	Online	No Longer Supported
POOL0053	Online	No Longer Supported
POOL0054	Online	No Longer Supported
POOL0055	Online	No Longer Supported
POOL0057	Online	No Longer Supported
POOL0059	Online	No Longer Supported
POOL0060	Online	No Longer Supported
POOL0061	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
POOL0062	Online	No Longer Supported
POOL0063	Online	No Longer Supported
POOL0064	Online	No Longer Supported
PRN GREATER THAN MAX FOR PGM...	Offline	No Longer Supported
PROGRAM <i>programe</i> ALREADY PROCESSED...	Offline	No Longer Supported
PROGRAM <i>nnnn</i> IS A DUMMY PROGRAM...	Offline	No Longer Supported
PROGRAM CALL NAME DOES NOT MATCH...	Offline	No Longer Supported
PROGRAM NAME IS A TRANSFER VECTOR...	Offline	No Longer Supported
PROGRAM NOT REAL TIME...	Offline	No Longer Supported
PROT0019E	Online	No Longer Supported
PTV NOT GENERATED IN SYSTEM...	Offline	No Longer Supported
RAM001	Online	No Longer Supported
RAM002	Online	No Longer Supported
RAM003	Online	No Longer Supported
RAM004	Online	No Longer Supported
RAM005	Online	No Longer Supported
RAM006	Online	No Longer Supported
RAM007	Online	No Longer Supported
RAM008	Online	No Longer Supported
RCTD0000I	Online	No Longer Supported
RCTD0002E	Online	No Longer Supported
RCTD0003E	Online	No Longer Supported
RCTD0004E	Online	No Longer Supported
RCTD0005E	Online	No Longer Supported
RCTD0006E	Online	No Longer Supported
RCTE0006E	Online	No Longer Supported
REC ID FIELD FOR <i>xxxx</i> INDICATES...	Offline	No Longer Supported
RECP000EA	Online	Changed
RECP001EA	Online	Changed
RECP0013W	Online	New
RECP0038I	Online	Changed
RECP003AI	Online	Changed
RECP003EA	Online	Changed
RECP0024I	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RECP0048A	Online	Changed
RECP0050I	Online	Changed
RECP0052A	Online	Changed
RECP0054A	Online	Changed
RECP005AA	Online	Changed
RECP005CI	Online	Changed
RECP00REA	Online	Changed
RECP0060T	Online	Changed
RECP0064T	Online	Changed
RECP0066T	Online	Changed
RECP0070A	Online	Changed
RECP0072A	Online	Changed
RECP0074I	Online	Changed
RECP0076I	Online	Changed
RECP0077E	Online	No Longer Supported
RECP0077I	Online	No Longer Supported
RECP0078E	Online	New
RECP0078I	Online	No Longer Supported
RECP007AA	Online	Changed
RECP007CA	Online	Changed
RECP007EI	Online	Changed
RECP0080I	Online	Changed
RECP0082A	Online	Changed
RECP0088A	Online	Changed
RECP008AA	Online	New
RECP0099T	Online	No Longer Supported
RE-ENTER LOAD MESSAGE	Online	No Longer Supported
REP CARD FORMAT ERROR DETECTED	Offline	No Longer Supported
REP CARD PROGRAM DOES NOT MATCH...	Offline	No Longer Supported
REQUEST REJECTED – NOT VALID...	Online	No Longer Supported
RFPC0003T	Online	Changed
RFPC0012T	Online	Changed
RFPC0014T	Online	No Longer Supported
RHLD0013I	Online	No Longer Supported
RHLD0014E	Online	No Longer Supported
RHLD0015I	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RHLD0016E	Online	No Longer Supported
RHLD0025E	Online	No Longer Supported
RHLD0030E	Online	No Longer Supported
RIPL0000I	Online	New
RIPL0009E	Online	New
RIPL0010E	Online	New
ROUT0001I	Online	New
ROUT0002E	Online	New
ROUT0003E	Online	New
ROUT0004E	Online	New
ROUT0005E	Online	New
ROUT0006E	Online	New
ROUT0007E	Online	New
ROUT0008I	Online	New
ROUT0009E	Online	New
ROUT0010E	Online	New
ROUT0011E	Online	New
ROUT0012E	Online	New
ROUT0013E	Online	New
ROUT0014I	Online	New
ROUT0015E	Online	New
ROUT0016E	Online	New
ROUT0017I	Online	New
RPGM0005E	Online	No Longer Supported
RPGM0002I	Online	Changed
RPGM0003I	Online	Changed
RPGM0004I	Online	Changed
RPGM0005W	Online	New
RPGM0006W	Online	Changed
RPGM0007W	Online	Changed
RPGM0008W	Online	Changed
RPGM0009E	Online	No Longer Supported
RPGM0010E	Online	No Longer Supported
RPGM0011E	Online	No Longer Supported
RPGM0012E	Online	Changed
RPGM0013W	Online	New
RPGM0014W	Online	New
RPGM0015E	Online	New
RPGM0016E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RPGM0017I	Online	New
RPGM0018E	Online	New
RPGM0019E	Online	New
RPGM0020E	Online	New
RPGM0021E	Online	New
RPGM0023E	Online	New
RPGM0033I	Online	New
RSTT0004A	Online	Changed
RSTT0005A	Online	Changed
RTC TAPE RECORD xxx HAS...	Offline	New
RTC TAPE RECORD xxx IS OUT...	Offline	New
RTDM0004I	Online	New
RTDM0005I	Online	New
RTDM0065E	Online	New
RTDM0066E	Online	New
RTDM0069E	Online	New
RTLP0000I	Online	No Longer Supported
RTLP0001I	Online	New
RTLP0002E	Online	New
RTLP0003E	Online	New
RTLP0004E	Online	New
RTLP0005E	Online	New
RTLP0006E	Online	New
RTLP0007E	Online	New
RTLP0008E	Online	New
RTLP0009E	Online	New
RTPL0050E	Online	No Longer Supported
RTPL0051E	Online	No Longer Supported
RTPL0052E	Online	No Longer Supported
RTPL0053E	Online	No Longer Supported
RTPL0054E	Online	No Longer Supported
RTPL0056E	Online	No Longer Supported
RTPL0057E	Online	No Longer Supported
RTPL0058E	Online	No Longer Supported
RTPL0060E	Online	No Longer Supported
RTPL0061E	Online	No Longer Supported
RTPL0062E	Online	No Longer Supported
RTPL0063W	Online	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RTT UNALBE NETWORK OPTION...	Online	No Longer Supported
SALO0023E	Offline	No Longer Supported
SALO0033E	Offline	No Longer Supported
SAL TABLE NOT FOUND	Offline	No Longer Supported
SAL TABLE NOT FOUND – JOB ABORTED	Offline	No Longer Supported
SALTBL BLKSZ IS NOT MULT...	Offline	No Longer Supported
SALTBL/IPAT TIME STAMP DOES...	Offline	New
SIPC0012I	Online	No Longer Supported
SIPC0013I	Online	No Longer Supported
SIPC0050T	Online	No Longer Supported
SIPC0051T	Online	No Longer Supported
SIPC0052T	Online	No Longer Supported
SIPC0053T	Online	No Longer Supported
SIPC0054T	Online	No Longer Supported
SIPC0056T	Online	No Longer Supported
SIPC0057T	Online	No Longer Supported
SIPC0058T	Online	No Longer Supported
SIPC0060T	Online	No Longer Supported
SIPC0061T	Online	No Longer Supported
SIPC0062T	Online	No Longer Supported
SIPC0063T	Online	No Longer Supported
SIPC0064T	Online	No Longer Supported
SIPC0065T	Online	No Longer Supported
SIPC0066T	Online	No Longer Supported
SIPC0067T	Online	No Longer Supported
SIPC0068T	Online	No Longer Supported
SIPC0069T	Online	No Longer Supported
SIPC0070T	Online	No Longer Supported
SIZE OF xxxxvv = yyyy...	Offline	No Longer Supported
SPER0001I	Online	New
SPER0002I	Online	New
SPER0003I	Online	New
SPER0005I	Online	New
SPER0006E	Online	New
SPER0007E	Online	New
SPER0008E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SPER0009E	Online	New
SPER0010E	Online	New
SPER0011E	Online	New
SPER0012I	Online	New
SSCP0003I	Online	New
SSCP0004E	Online	New
SSCP0052E	Online	No Longer Supported
SSCP0053E	Online	No Longer Supported
SSCP0078E	Online	Changed
SS/SSU	Online	No Longer Supported
STOP	Online	No Longer Supported
STPP0003T	Online and Offline	New
STPP0004T	Online and Offline	New
STPP0005T and Offline	Online	New
STPP0006T	Online and Offline	New
STPP0007T	Online and Offline	New
STPP0008W	Online and Offline	New
STRC0001I	Online	New
STRC0001E	Online	New
SYSG0001I	Online	New
SYSG0002I	Online	New
SYSG0003I	Online	New
SYSG0004I	Online	New
SYSG0005I	Online	New
SYSG0006I	Online	New
SYSG0007I	Online	New
SYSG0008I	Online	New
SYSG0050E	Online	New
SYSG0051E	Online	New
SYSG0052E	Online	New
SYSG0053E	Online	New
SYSG0054E	Online	New
SYSG0055E	Online	New
SYSG0056E	Online	New
SYSG0057E	Online	New
SYSG0058E	Online	New
SYSG0059E	Online	New
SYSG0060E	Online	New
SYSG0064E	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SYSTEM IS NOT IN 1052 STATE	Online	No Longer Supported
TABLE FULL – OLD COMPOSITE...	Online	No Longer Supported
TABLE INDEX OUT OF RANGE	Offline	No Longer Supported
TAPE NOT MOUNTED – MOUNT TAPE...	Online	No Longer Supported
THERE IS A PREVIOUS VERSION OF PROGRAM...	Offline	No Longer Supported
TOO MANY DIGITS	Online	No Longer Supported
TOO MANY PROGRAMS SPECIFIED	Online	No Longer Supported
TPLD0001I	Online	New
TPLD0002I	Online	New
TPLD0003I	Online	New
TPLD0101E	Online	New
TPLD0102E	Online	New
TPLD0103E	Online	New
TPLD0104E	Online	New
TPLD0105E	Online	New
TPLD0106E	Online	New
TPLD0107E	Online	New
TPLD0108E	Online	New
TPLD0109E	Online	New
TPLD0110W	Online	New
TPLD0111E	Online	New
TPLD0113W	Online	New
TPLD0114E	Online	New
TPLD0115W	Online	New
TPLD0116E	Online	New
TPLD0117E	Online	New
TPLD0118E	Online	New
TPLD0119E	Online	New
TPLD0120W	Online	New
TPLD0121E	Online	New
TRANSFER VECTOR FIELD TOO LONG	Offline	No Longer Supported
TRANSFER VECTOR NO NUMERIC	Offline	No Longer Supported
TRANSFER VECTOR OUT OF RANGE	Offline	No Longer Supported

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
TRANSFER VECTORS NOT ALLOWED...	Offline	No Longer Supported
TSAL0001I	Online	No Longer Supported
TSAL0002E	Online	No Longer Supported
TSAL0003I	Online	No Longer Supported
TSAL0004E	Online	No Longer Supported
UIM10001E	Online	New
UIM10002E	Online	New
UNABLE TO ACCESS SAVE AREA	Online	No Longer Supported
UNABLE TO FIND ACTIVE VERSION...	Online	No Longer Supported
UNABLE TO FIND KPT. A OR CORE...	Online	No Longer Supported
UNABLE TO FIND TABLE	Online	No Longer Supported
UNABLE TO SAVE VERSION OF PROGRAM	Online	No Longer Supported
UNKNOWN ERROR OCCURRED DURING LINK...	Offline	No Longer Supported
UNRECOGNIZABLE ERROR RETURN CODE...	Offline	No Longer Supported
URIO0001W	Online	New
USER COMPONENT NOT DEFINED IN CTKX	Offline	New
UTIL	Online	No Longer Supported
VFAC0001I	Online	No Longer Supported
VFAC0002I	Online	No Longer Supported
VFAC0004I	Online	No Longer Supported
VFAC0005I	Online	No Longer Supported
VFAC0006I	Online	Changed
VFAC0007I	Online	Changed
VFAC0008I	Online	No Longer Supported
VFAC0009I	Online	No Longer Supported
VFAC0010I	Online	New
VFAC0011I	Online	New
VFAC0012I	Online	New
VFAC0013I	Online	New
VFAC0014I	Online	New
VFAC0015I	Online	New
VFAC0016I	Online	New
VFAC0017I	Online	New

Table 25. Changes to Messages and System Errors in the TPF 4.1 System (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
VFAC0050T	Online	No Longer Supported
VFAC0051A	Online	No Longer Supported
VFAC0052A	Online	No Longer Supported
VFAC0055T	Online	No Longer Supported
VFAC0056T	Online	No Longer Supported
VFAC0057T	Online	No Longer Supported
VFAC0058T	Online	No Longer Supported
VFAC0059E	Online	No Longer Supported
VFAC0060E	Online	No Longer Supported
VFAC0061E	Online	No Longer Supported
VFAC0065T	Online	No Longer Supported
VFAC0066E	Online	No Longer Supported
VFAC0072T	Online	No Longer Supported
VFAC0074T	Online	No Longer Supported
VFAC0075T	Online	No Longer Supported
VFAC0082I	Online	New
VFAC0083E	Online	New
VFAC0084E	Online	New
VFAC0085I	Online	New
WARNING – ELDR CLEAR CARD...	Offline	No Longer Supported
WARNING – G.FILE CONFIG CARD...	Offline	No Longer Supported
WARNING – IMAGE CLEAR CARD...	Offline	No Longer Supported
WARNING – PROGRAM CONTAINS...	Offline	No Longer Supported
WARNING – PROGRAM NAME...	Offline	No Longer Supported
WGTA VALUE MUST BE 2 OR MORE	Online	No Longer Supported
ZDUMP	Online	No Longer Supported
ZRIPL	Online	No Longer Supported
nnn PGM(S) WRITTEN OUT...	Offline	No Longer Supported
E217	Offline ACF/SNA Table Generation (OSTG)	No Longer Supported
E221	Offline ACF/SNA Table Generation (OSTG)	No Longer Supported

New, Changed, and Obsolete Areas of the TPF 4.1 System

This section provides information about different areas of the TPF 4.1 system that are new, changed, or no longer supported.

Fixed File Records

Table 26 summarizes the fixed file record changes to the TPF 4.1 system.

Table 26. Changes to Fixed File Records

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#MRES4	No Longer Supported	Not Applicable
#MRESL	No Longer Supported	Not Applicable
#MRESS	No Longer Supported	Not Applicable
#OLDSV	No Longer Supported	Not Applicable
#RRTRI	Changed	In the TPF 3.1 system, #RRTRI was a 1055-byte record. In the TPF 4.1 system, #RRTRI must be defined as a 4 K record.
#SALTB	No Longer Supported	Not Applicable
#WRES4	No Longer Supported	Not Applicable
#WRESL	No Longer Supported	Not Applicable
#WRESS	No Longer Supported	Not Applicable
#XTCBR	No Longer Supported	Not Applicable

Segments

In the TPF 4.1 system, most segments were changed in some way. Table 27 summarizes the segment changes in the TPF 4.1 system.

Table 27. Changes to Segments

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
APTV	Offline	No Longer Supported	Not Applicable
ARDA	Real-Time	No Longer Supported	Not Applicable
ARDI	Real-Time	No Longer Supported	Not Applicable
ARDQ	Real-Time	No Longer Supported	Not Applicable
ARDR	Real-Time	No Longer Supported	Not Applicable
ARDT	Real-Time	No Longer Supported	Not Applicable
ARDX	Real-Time	No Longer Supported	Not Applicable
ARDZ	Real-Time	No Longer Supported	Not Applicable
ARD1	Real-Time	No Longer Supported	Not Applicable
ARD2	Real-Time	No Longer Supported	Not Applicable
ARD3	Online Assembler	Changed	This segment was changed to delete the automated patch routine (ARD) support.
ARD4	Real-Time	No Longer Supported	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
ARD5 – ARD9	Online Assembler	Changed	These segments were changed to delete the automated patch routine (ARD support).
ARDW	Online Assembler	Changed	This segment was changed to delete the automated patch routine (ARD) support.
ARDY	Online Assembler	Changed	This segment was changed to delete the automated patch routine (ARD) support.
BDBA	Online Assembler	Changed	This segment contains various internal changes to support the database reorganization utility for the TPF 4.1 system.
BDBF	Online Assembler	Changed	This segment contains various internal changes to support the database reorganization utility for the TPF 4.1 system.
BDBG	Online Assembler	Changed	This segment contains various internal changes to support the database reorganization utility for the TPF 4.1 system.
BDBL	Online Assembler	Changed	This segment contains various internal changes to support the database reorganization utility for the TPF 4.1 system.
BDBM	Online Assembler	Changed	This segment contains various internal changes to support the database reorganization utility for the TPF 4.1 system.
BDBN	Online Assembler	Changed	This segment contains various internal changes to support the database reorganization utility for the TPF 4.1 system.
BDBP	Online Assembler	Changed	This segment contains various internal changes to support the database reorganization utility for the TPF 4.1 system.
BDBQ	Real-Time	No Longer Supported	Not Applicable
BKD8	Real-Time Assembler	New	Not Applicable
BMDW	Real-Time	No Longer Supported	Not Applicable
BMD0	Online Assembler	Changed	This segment now contains the selective file trace (SFT) initialization code from the BMD2 segment.
BMD1	Online Assembler	Changed	<p>The BMD10001 online message has been deleted because 3420 support has been dropped. The BMD10002 online message has been changed so that is not model dependent.</p> <p>See <i>Messages (System Error and Offline)</i> and <i>Messages (Online)</i> for more information about this message.</p>
BMD2	Real-Time	No Longer Supported	Not Applicable
BMD3	Online Assembler	Changed	This segment now contains the relevant terminate code from the BMD2 segment.
BMD4	Online Assembler	Changed	This segment now performs all the canned error response processing.

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
BMD5	Online Assembler	Changed	This segment now contains BMD6 calls changed to BMD4 calls.
BMD6	Real-Time	No Longer Supported	Not Applicable
BMTB	Real-Time	No Longer Supported	Not Applicable
BMT0	Real-Time	No Longer Supported	Not Applicable
BMT1	Real-Time	No Longer Supported	Not Applicable
BMT2	Real-Time	No Longer Supported	Not Applicable
BMT3	Online Assembler	Changed	This segment now writes the entire main I-stream SVC to tape for the trace count function.
BMT4	Real-Time	No Longer Supported	Not Applicable
BMT5	Online Assembler	Changed	This segment now initializes the count field of each entry in the main I-stream SVC table for the trace count function.
BMT6	Online Assembler	Changed	This segment now saves the address of the current and required core level tables in CRTT for the trace count function.
BMT9	Real-Time	No Longer Supported	Not Applicable
BMTA	Online Assembler	Changed	This segment now calls the resource vector table (RVT) entry locating routine in CRTT instead of the BMT0 segment.
BMTC	Online Assembler	Changed	This mnemonic PTV has been deleted from this segment.
BMTD	Online Assembler	Changed	The macro group PTV has been deleted from this segment.
BMTE	Online Assembler	Changed	This segment now contains all error messages sent by initialization and shutdown segments.
BPTV	Online Assembler	Changed	This segment has been moved into the CCUTIL CP CSECT.
BXDB	Real-Time	No Longer Supported	Not Applicable
BXFB	Real-Time	No Longer Supported	Not Applicable
BXGH	Real-Time	No Longer Supported	Not Applicable
BXHH	Real-Time	No Longer Supported	Not Applicable
CAC3	Real-Time	No Longer Supported	Not Applicable
CCCWTN	CP CSECT	New	Not Applicable
CCDCOL	CP CSECT	New	Not Applicable
CCSTOR	CP CSECT	New	Not Applicable
CCUTIL	CP CSECT	New	Not Applicable
CEET	Online Assembler	Changed	The selective file dump and trace (SFDT) part of the code and constants have been moved to CTSF in the CCUTIL CP CSECT.

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CEFZ	Online Assembler	Changed	Real-time tape name equates in the system allocator (SAL) table are no longer supported in the TPF 4.1 system. However, the CEFZ segment has been changed so that you can code the RTMAP macros in this segment to define real-time tape equates. (You must code one RTMAP macro for each real-time tape name equate being generated.)
CELA	Real-Time C Language	New	Not Applicable
CELB	Real-Time C Language	New	Not Applicable
CELC	Real-Time C Language	New	Not Applicable
CELD	Real-Time C Language	New	Not Applicable
CELE	Real-Time C Language	New	Not Applicable
CELF	Real-Time C Language	New	Not Applicable
CELG	Real-Time Assembler	New	Not Applicable
CELH	Real-Time C Language	New	Not Applicable
CELI	Real-Time C Language	New	Not Applicable
CELJ	Real-Time C Language	New	Not Applicable
CELK	Real-Time C Language	New	Not Applicable
CELL	Real-Time C Language	New	Not Applicable
CELM	Real-Time C Language	New	Not Applicable
CELN	Real-Time C Language	New	Not Applicable
CELO	Real-Time C Language	New	Not Applicable
CELP	Real-Time C Language	New	Not Applicable
CELR	Real-Time C Language	New	Not Applicable
CELS	Real-Time C Language	New	Not Applicable
CELT	Real-Time C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CELU	Real-Time C Language	New	Not Applicable
CELV	Real-Time C Language	New	Not Applicable
CELW	Real-Time C Language	New	Not Applicable
CELX	Real-Time C Language	New	Not Applicable
CELY	Real-Time C Language	New	Not Applicable
CELZ	Real-Time C Language	New	Not Applicable
CEL0	Real-Time C Language	New	Not Applicable
CEL1	Real-Time C Language	New	Not Applicable
CEL2	Real-Time C Language	New	Not Applicable
CEL3	Real-Time Assembler	New	Not Applicable
CEL4	Real-Time C Language	New	Not Applicable
CEL5	Real-Time C Language	New	Not Applicable
CEL6	Real-Time C Language	New	Not Applicable
CEL7	Real-Time C	New	Not Applicable
CEL8	Real-Time C Language	New	Not Applicable
CEL9	Real-Time Assembler	New	Not Applicable
CERC	Real-Time C Language	New	Not Applicable
CHDD	Online Assembler	Changed	Most of the function found in the TPF 3.1 system has been moved to the new CHDF segment in the TPF 4.1 system.
CHDF	Real-Time Assembler	New	Not Applicable
CHKA	Online Assembler	Changed	In the TPF 4.1 system, the function of this segment has been expanded. In the TPF 3.1 system, this segment used to keypoint the CCB tables. In the TPF 4.1 system, this segment keypoints the SCB1 and SCB2 tables in addition to the CCB tables.
CHKB	Real-Time Assembler	New	Not Applicable
CHKR	Real-Time Assembler	New	Not Applicable
CHNC	Real-Time Assembler	New	Not Applicable
CHNL	Real-Time Assembler	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CHNO	Real-Time Assembler	New	Not Applicable
CHNP	Real-Time Assembler	New	Not Applicable
CHNR	Real-Time Assembler	New	Not Applicable
CHNS	Real-Time Assembler	New	Not Applicable
CHNT	Real-Time Assembler	New	Not Applicable
CHNV	Real-Time Assembler	New	Not Applicable
CHNX	Real-Time Assembler	New	Not Applicable
CHQI	Real-Time Assembler	New	Not Applicable
CHRG	Real-Time Assembler	New	Not Applicable
CHRM	Real-Time Assembler	New	Not Applicable
CHRP	Real-Time Assembler	New	Not Applicable
CHRR	Real-Time Assembler	New	Not Applicable
CHRS	Real-Time Assembler	New	Not Applicable
CHRT	Real-Time Assembler	New	Not Applicable
CHRX	Real-Time Assembler	New	Not Applicable
CHSB	Real-Time Assembler	New	Not Applicable
CHSD	Real-Time Assembler	New	Not Applicable
CHZL	Real-Time Assembler	New	Not Applicable
CHZN	Real-Time Assembler	New	Not Applicable
CHZS	Real-Time Assembler	New	Not Applicable
CHZT	Real-Time Assembler	New	Not Applicable
CHZU	Real-Time Assembler	New	Not Applicable
CHZW	Real-Time Assembler	New	Not Applicable
CHZX	Real-Time Assembler	New	Not Applicable
CHZY	Real-Time Assembler	New	Not Applicable
CIJA	Real-Time	No Longer Supported	Not Applicable
CIJB	Real-Time	No Longer Supported	Not Applicable
CIJD	Real-Time	No Longer Supported	Not Applicable
CIJP	Real-Time	No Longer Supported	Not Applicable
CIKA	Real-Time C Language	New	Not Applicable
CIKB	Real-Time C Language	New	Not Applicable
CIKC	Real-Time C Language	New	Not Applicable
CIKD	Real-Time C Language	New	Not Applicable
CIKE	Real-Time C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CILA	Real-Time C Language	New	Not Applicable
CILB	Real-Time C Language	New	Not Applicable
CIL0	Real-Time C Language	New	Not Applicable
CIL1	Real-Time C Language	New	Not Applicable
CIL2	Real-Time C Language	New	Not Applicable
CIL3	Real-Time C Language	New	Not Applicable
CIL4	Real-Time C Language	New	Not Applicable
CIL5	Real-Time C Language	New	Not Applicable
CIL6	Real-Time C Language	New	Not Applicable
CIL7	Real-Time C Language	New	Not Applicable
CIMA	Real-Time C Language	New	Not Applicable
CIMB	Real-Time C Language	New	Not Applicable
CIMC	Real-Time C Language	New	Not Applicable
CIMD	Real-Time C Language	New	Not Applicable
CIME	Real-Time C Language	New	Not Applicable
CIMF	Real-Time C Language	New	Not Applicable
CIMG	Real-Time C Language	New	Not Applicable
CIMH	Real-Time C Language	New	Not Applicable
CIMI	Real-Time C Language	New	Not Applicable
CIMJ	Real-Time C Language	New	Not Applicable
CIMK	Real-Time C Language	New	Not Applicable
CIML	Real-Time C Language	New	Not Applicable
CIMN	Real-Time C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CIMO	Real-Time C Language	New	Not Applicable
CIMP	Real-Time C Language	New	Not Applicable
CIMQ	Real-Time C Language	New	Not Applicable
CIMR	Real-Time C Language	New	Not Applicable
CIMS	Real-Time C Language	New	Not Applicable
CIMT	Real-Time C Language	New	Not Applicable
CIMU	Real-Time C Language	New	Not Applicable
CIMV	Real-Time C Language	New	Not Applicable
CIMW	Real-Time C Language	New	Not Applicable
CIMX	Real-Time C Language	New	Not Applicable
CIMY	Real-Time C Language	New	Not Applicable
CIMZ	Real-Time C Language	New	Not Applicable
CIM0	Real-Time C Language	New	Not Applicable
CIM3	Real-Time C Language	New	Not Applicable
CIM4	Real-Time C Language	New	Not Applicable
CIM5	Real-Time C Language	New	Not Applicable
CIM6	Real-Time C Language	New	Not Applicable
CIM7	Real-Time C Language	New	Not Applicable
CIM8	Real-Time C Language	New	Not Applicable
CIM9	Real-Time C Language	New	Not Applicable
CIP0	Real-Time Assembler	New	Not Applicable
CJIS	Online Assembler	Changed	This segment has been moved to the CCCWTN CP CSECT from the CCSONS CP CSECT.
CLDA	Real-Time C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CLDB	Real-Time C Language	New	Not Applicable
CLDC	Real-Time C Language	New	Not Applicable
CLDF	Real-Time C Language	New	Not Applicable
CLDG	Real-Time C Language	New	Not Applicable
CLDH	Real-Time C Language	New	Not Applicable
CLDI	Real-Time C Language	New	Not Applicable
CLDJ	Real-Time C Language	New	Not Applicable
CLDK	Real-Time C Language	New	Not Applicable
CLDL	Real-Time C Language	New	Not Applicable
CLDM	Real-Time C Language	New	Not Applicable
CLDN	Real-Time C Language	New	Not Applicable
CLDO	Real-Time C Language	New	Not Applicable
CLDP	Real-Time C Language	New	Not Applicable
CLDT	Real-Time C Language	New	Not Applicable
CLDU	Real-Time C Language	New	Not Applicable
CLDV	Real-Time C Language	New	Not Applicable
CLDW	Real-Time C Language	New	Not Applicable
CLDX	Real-Time C Language	New	Not Applicable
CLDY	Real-Time C Language	New	Not Applicable
CLDZ	Real-Time C Language	New	Not Applicable
CLD0	Real-Time C Language	New	Not Applicable
CLD1	Real-Time Assembler	New	Not Applicable
CLD3	Real-Time C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CLD4	Real-Time Assembler	New	Not Applicable
CLD6	Real-Time C Language	New	Not Applicable
CLD7	Real-Time C Language	New	Not Applicable
CLD8	Real-Time C Language	New	Not Applicable
CLD9	Real-Time C Language	New	Not Applicable
CLEA	Real-Time C Language	New	Not Applicable
CLEB	Real-Time C Language	New	Not Applicable
CLEC	Real-Time C Language	New	Not Applicable
CLEF	Real-Time C Language	New	Not Applicable
CLEG	Real-Time C Language	New	Not Applicable
CLEI	Real-Time C Language	New	Not Applicable
CLEJ	Real-Time C Language	New	Not Applicable
CLEK	Real-Time Assembler	New	Not Applicable
CLEL	Real-Time C Language	New	Not Applicable
CLEM	Real-Time C Language	New	Not Applicable
CLEN	Real-Time C Language	New	Not Applicable
CLEO	Real-Time C Language	New	Not Applicable
CLEP	Real-Time C Language	New	Not Applicable
CLEQ	Real-Time C Language	New	Not Applicable
CLER	Real-Time C Language	New	Not Applicable
CLES	Real-Time C Language	New	Not Applicable
CLET	Real-Time C Language	New	Not Applicable
CLEU	Real-Time Assembler	New	Not Applicable
CLEV	Real-Time C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CLEW	Real-Time C Language	New	Not Applicable
CLEX	Real-Time C Language	New	Not Applicable
CLEY	Real-Time C Language	New	Not Applicable
CLEZ	Real-Time C Language	New	Not Applicable
CLE1	Real-Time C Language	New	Not Applicable
CLE2	Real-Time C Language	New	Not Applicable
CLE3	Real-Time C Language	New	Not Applicable
CLE4	Real-Time C Language	New	Not Applicable
CLE5	Real-Time C	New	Not Applicable
CLE6	Real-Time C Language	New	Not Applicable
CLE7	Real-Time C Language	New	Not Applicable
CLE8	Real-Time C Language	New	Not Applicable
CLE9	Real-Time C Language	New	Not Applicable
CLHB	Online Assembler	Changed	This segment has been moved into the CCSTOR CP CSECT from the CCCLHR CP CSECT.
CLXA	Online Assembler	Changed	This segment has been changed to allow the SENDC macro to invoke the ROUTC user exit. See <i>TPF System Macros</i> for more information about the SENDC macro.
CMSK	Real-Time	No Longer Supported	Not Applicable
CMTW	Real-Time	No Longer Supported	Not Applicable
CMW0	Real-Time Assembler	Changed	This segment no longer handles the output message transmission queuing function for LU 6.2. This function is now handled by the CMW3 segment. In addition, the information passed from the CMW0 segment to the user exits was enhanced.
CMW2	Real-Time	No Longer Supported	Not Applicable
CMW3	Real-Time Assembler	New	Not Applicable
CNOS	Real-Time (HPO Feature)	No Longer Supported	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CNPA	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNPB	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNPC	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNPD	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNPE	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNP1	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNP2	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNP3	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNP4	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNP5	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNP7	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNP8	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNP9	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNQA	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNQC	Real-Time (HPO Feature)	No Longer Supported	Not Applicable
CNVNN1	Offline	No Longer Supported	Not Applicable
COEE	Real-Time	No Longer Supported	Not Applicable
COLA	Real-Time C Language	New	Not Applicable
COLC	Real-Time C Language	New	Not Applicable
COLE	Real-Time C Language	New	Not Applicable
COLF	Real-Time C Language	New	Not Applicable
COLG	Real-Time C Language	New	Not Applicable
COLH	Real-Time C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
COLI	Real-Time C Language	New	Not Applicable
COLJ	Real-Time C Language	New	Not Applicable
COLK	Real-Time C Language	New	Not Applicable
COLM	Real-Time C Language	New	Not Applicable
COLN	Offline C Language	New	Not Applicable
COLS	Real-Time C Language	New	Not Applicable
COLT	Real-Time C Language	New	Not Applicable
COLV	Real-Time C Language	New	Not Applicable
COLW	Real-Time C Language	New	Not Applicable
COLX	Real-Time C Language	New	Not Applicable
COLY	Real-Time C Language	New	Not Applicable
COLZ	Real-Time C Language	New	Not Applicable
COL0	Real-Time C Language	New	Not Applicable
COL1	Real-Time C Language	New	Not Applicable
COL2	Real-Time C Language	New	Not Applicable
COL3	Real-Time C Language	New	Not Applicable
COL4	Real-Time C Language	New	Not Applicable
COL5	Real-Time C Language	New	Not Applicable
COL6	Real-Time C Language	New	Not Applicable
COL7	Real-Time C Language	New	Not Applicable
COL8	Real-Time C Language	New	Not Applicable
COL9	Real-Time C Language	New	Not Applicable
CONM	Real-Time	No Longer Supported	Not Applicable
COS5	Real-Time Assembler	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
COS6	Real-Time Assembler	New	Not Applicable
COT1	Real-Time Assembler	New	Not Applicable
COT2	Real-Time Assembler	New	Not Applicable
COT5	Real-Time Assembler	New	Not Applicable
COT7	Real-Time Assembler	New	Not Applicable
COV1	Real-Time	No Longer Supported	Not Applicable
COWA	Real-Time	No Longer Supported	Not Applicable
CO0E	Real-Time (C Language)	No Longer Supported	Not Applicable
CPEP	Real-Time Assembler	New	Not Applicable
CPRE	Real-Time Assembler	New	Not Applicable
CPSU	Real-Time Assembler	New	Not Applicable
CPTV	Real-Time Assembler	Changed	This segment has been moved to the CCUTIL CP CSECT.
CRBB	Real-Time	No Longer Supported	Not Applicable
CRDQ	Changed	Online Assembler	In the TPF 3.1 system, this segment contained CRDR. In the TPF 4.1 system, CRDR has been moved out of the CRDQ segment and created as a separate segment.
CRDY	Real-Time (TPFAR Feature)	No Longer Supported	Not Applicable
CREJ	C Language (TPFAR Feature)	New	Not Applicable
CRHH	Real-Time	No Longer Supported	Not Applicable
CRIJ	Real-Time	No Longer Supported	Not Applicable
CRKK	Real-Time	No Longer Supported	Not Applicable
CRLA	Real-Time C Language	New	Not Applicable
CRLB	Real-Time C Language	New	Not Applicable
CRLC	Real-Time C Language	New	Not Applicable
CRLD	Real-Time C Language	New	Not Applicable
CRLE	Real-Time C Language	New	Not Applicable
CRLF	Real-Time C Language	New	Not Applicable
CRLG	Real-Time C Language	New	Not Applicable
CRLI	Real-Time	No Longer Supported	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CRLH	Real-Time C Language	New	Not Applicable
CRLI	Real-Time C Language	New	Not Applicable
CRLJ	Real-Time C Language	New	Not Applicable
CRLK	Real-Time C Language	New	Not Applicable
CRLM	Real-Time C Language	New	Not Applicable
CRLN	Real-Time C Language	New	Not Applicable
CRLO	Real-Time C Language	New	Not Applicable
CRLP	Real-Time C Language	New	Not Applicable
CRLR	Real-Time C Language	New	Not Applicable
CRLS	Real-Time C Language	New	Not Applicable
CRLT	Real-Time C Language	New	Not Applicable
CRMM	Real-Time	No Longer Supported	Not Applicable
CRNN	Real-Time	No Longer Supported	Not Applicable
CROO	Real-Time	No Longer Supported	Not Applicable
CSCA	Real-Time Assembler	New	Not Applicable
CSCB	Real-Time Assembler	New	Not Applicable
CSDU	Real-Time	No Longer Supported	Not Applicable
CSDX	Real-Time	No Longer Supported	Not Applicable
CSDY	Real-Time	No Longer Supported	Not Applicable
CSEB	Real-Time	No Longer Supported	Not Applicable
CSEG	Real-Time	No Longer Supported	Not Applicable
CSEH	Real-Time	No Longer Supported	Not Applicable
CSEK	Real-Time	No Longer Supported	Not Applicable
CSEM	Real-Time	No Longer Supported	Not Applicable
CSEN	Real-Time	No Longer Supported	Not Applicable
CSEO	Real-Time	No Longer Supported	Not Applicable
CSEP	Real-Time	No Longer Supported	Not Applicable
CSFB	Real-Time	No Longer Supported	Not Applicable
CSFU	Real-Time C Language	New	Not Applicable
CSFV	Real-Time Assembler	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CSFW	Real-Time C Language	New	Not Applicable
CSFX	Real-Time C Language	Changed	In the TPF 3.1 system, this segment was written in assembler language. In the TPF 4.1 system, this segment has been written in the IBM C language.
CSFY	Real-Time C Language	Changed	In the TPF 3.1 system, this segment was written in assembler language. In the TPF 4.1 system, this segment has been written in the IBM C language.
CSFZ	Real-Time C Language	New	Not Applicable
CSF6	Real-Time C Language	New	Not Applicable
CSF7	Real-Time C Language	New	Not Applicable
CSF8	Real-Time C Language	New	Not Applicable
CSF9	Real-Time C Language	New	Not Applicable
CSJQ	Real-Time	No Longer Supported	Not Applicable
CSJT	Real-Time	No Longer Supported	Not Applicable
CSJZ	Real-Time Assembler	New	Not Applicable
CSNU	Real-Time	No Longer Supported	Not Applicable
CSRB	Real-Time C Language	New	Not Applicable
CSRD	Real-Time C Language	Changed	In the TPF 3.1 system, this segment was written in assembler language. In the TPF 4.1 system, this segment has been written in the IBM C language.
CSRE	Real-Time C Language	New	Not Applicable
CSRF	Real-Time C Language	New	Not Applicable
CSRG	Real-Time C Language	New	Not Applicable
CSRH	Real-Time C Language	New	Not Applicable
CSRI	Real-Time C Language	New	Not Applicable
CSRJ	Real-Time C Language	New	Not Applicable
CSRK	Real-Time C Language	New	Not Applicable
CSRL	Real-Time C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CSTK	Real-Time Assembler	New	Not Applicable
CS9A	Real-Time	No Longer Supported	Not Applicable
CTK5	Real-Time Assembler	New	Not Applicable
CTU5	Real-Time C Language	New	Not Applicable
CTU6	Real-Time C Language	New	Not Applicable
CTU7	Real-Time C Language	New	Not Applicable
CT24	Real-Time C Language	Changed	See “New, Changed, and Obsolete User Exits” on page 51 for a description of changes to this segment.
CT25	Real-Time C Language	Changed	See “New, Changed, and Obsolete User Exits” on page 51 for a description of changes to this segment.
CT26	Real-Time C Language	Changed	See “New, Changed, and Obsolete User Exits” on page 51 for a description of changes to this segment.
CUAE	Online Assembler	Changed	This segment has been changed to delete automated patch routine (ARD) support.
CVAC	Real-Time	No Longer Supported	Not Applicable
CVAE	Real-Time	No Longer Supported	Not Applicable
CVAG	Real-Time	No Longer Supported	Not Applicable
CVAI	Real-Time	No Longer Supported	Not Applicable
CVAJ	Real-Time	No Longer Supported	Not Applicable
CVAS	Real-Time	No Longer Supported	Not Applicable
CVAT	Real-Time	No Longer Supported	Not Applicable
CVA6	Real-Time Assembler	New	Not Applicable
CVA7	Real-Time C Language	New	Not Applicable
CVEH	Real-Time	No Longer Supported	Not Applicable
CVFA	Real-Time	No Longer Supported	Not Applicable
CVFR	Real-Time	No Longer Supported	Not Applicable
CVF0	Real-Time	No Longer Supported	Not Applicable
CVF5	Real-Time	No Longer Supported	Not Applicable
CVF6	Real-Time	No Longer Supported	Not Applicable
CVHG	Real-Time	No Longer Supported	Not Applicable
CVHV	Real-Time	No Longer Supported	Not Applicable
CVJA	Real-Time	No Longer Supported	Not Applicable
CVJM	Real-Time	No Longer Supported	Not Applicable
CVJP	Real-Time	No Longer Supported	Not Applicable
CVKF	Real-Time	No Longer Supported	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CVLP	Real-Time	No Longer Supported	Not Applicable
CVLT	Real-Time	No Longer Supported	Not Applicable
CVLV	Real-Time	No Longer Supported	Not Applicable
CVLW	Real-Time	No Longer Supported	Not Applicable
CVME	Real-Time	No Longer Supported	Not Applicable
CVMF	Real-Time	No Longer Supported	Not Applicable
CVMJ	Real-Time	No Longer Supported	Not Applicable
CVNT	Real-Time	No Longer Supported	Not Applicable
CVOD	Real-Time	No Longer Supported	Not Applicable
CVOL	Real-Time	No Longer Supported	Not Applicable
CVPA	Real-Time Assembler	New	Not Applicable
CVQJ	Real-Time	No Longer Supported	Not Applicable
CVQM	Real-Time	No Longer Supported	Not Applicable
CVRI	Real-Time C Language	New	Not Applicable
CVRR	Real-Time	No Longer Supported	Not Applicable
CVRS	Real-Time	No Longer Supported	Not Applicable
CVSD	Real-Time	No Longer Supported	Not Applicable
CVTF	Real-Time	No Longer Supported	Not Applicable
CVWV	Real-Time	No Longer Supported	Not Applicable
CVYC	Real-Time	No Longer Supported	Not Applicable
CVZ3	Real-Time C Language	New	Not Applicable
CWCT	Real-Time	No Longer Supported	Not Applicable
CWGB	Real-Time	No Longer Supported	Not Applicable
CWTT	Real-Time	No Longer Supported	Not Applicable
CYBB	Real-Time	No Longer Supported	Not Applicable
CYB1	Real-Time Assembler	New	Not Applicable
CYB2	Real-Time C Language	New	Not Applicable
CYB3	Real-Time Assembler	New	Not Applicable
CYMZA	FCTBG Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
CYMZB	FCTBG Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
CYMZC	FCTBG Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CYMZD	FCTBG Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
CYRB	Real-Time	No Longer Supported	Not Applicable
CYYI	Real-Time Assembler	New	Not Applicable
CZMN	Real-Time	No Longer Supported	Not Applicable
CZM1	Real-Time	No Longer Supported	Not Applicable
CZM3	Real-Time	No Longer Supported	Not Applicable
CZM4	Real-Time	No Longer Supported	Not Applicable
CZM5	Real-Time	No Longer Supported	Not Applicable
CZN0	Real-Time	No Longer Supported	Not Applicable
CZN1	Real-Time	No Longer Supported	Not Applicable
CZSC	Real-Time	No Longer Supported	Not Applicable
CZSD	Real-Time	No Longer Supported	Not Applicable
CZXG	Real-Time C Language	New	Not Applicable
CZXH	Real-Time C Language	New	Not Applicable
CZXI	Real-Time Assembler	New	Not Applicable
CZXK	Real-Time C Language	New	Not Applicable
CZXL	Real-Time C Language	New	Not Applicable
CZXM	Real-Time Assembler	New	Not Applicable
C103	Real-Time C Language	New	Not Applicable
C104	Real-Time C Language	New	Not Applicable
C105	Real-Time C Language	New	Not Applicable
C106	Real-Time C Language	New	Not Applicable
C107	Real-Time C Language	New	Not Applicable
C108	Real-Time C Language	New	Not Applicable
C109	Real-Time C Language	New	Not Applicable
C110	Real-Time C Language	New	Not Applicable
C111	Real-Time C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
C266	Real-Time C Language	New	Not Applicable
C267	Real-Time C Language	New	Not Applicable
C269	Real-Time Assembler	New	Not Applicable
C273	Real-Time Assembler	New	Not Applicable
C274	Real-Time Assembler	New	Not Applicable
C275	Real-Time Assembler	New	Not Applicable
C276	Real-Time Assembler	New	Not Applicable
C277	Real-Time Assembler	New	Not Applicable
C278	Real-Time C Language	New	Not Applicable
C279	Real-Time Assembler	New	Not Applicable
C280	Real-Time C Language	New	Not Applicable
C281	Real-Time Assembler	New	Not Applicable
C282	Real-Time Assembler	New	Not Applicable
C285	Real-Time Assembler	New	Not Applicable
C286	Real-Time Assembler	New	Not Applicable
C287	Real-Time Assembler	New	Not Applicable
C288	Real-Time Assembler	New	Not Applicable
C290	Real-Time Assembler	New	Not Applicable
C291	Real-Time Assembler	New	Not Applicable
C\$GTSZ	SIP Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
C\$IDFUNC	SIP Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
C\$MSOUT	Online Assembler	Changed	This segment has been moved from the C feature of the TPF 3.1 system into the High Performance Option feature (HPO feature) of the TPF 4.1 system.
C\$PI1DT	Online Assembler	Changed	This segment has been moved from the C feature of the TPF 3.1 system into the TPF 4.1 base.
DFRIDT	SIP Generated (ACP.SYMACRO) (See Note 1.)	No Longer Supported	Not Applicable
ECBUDS	SIP Generated (ACP.SYMACRO) (See Note 1.)	No Longer Supported	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
ECBUEQ	SIP Generated (ACP.SYMACRO) (See Note 1.)	No Longer Supported	Not Applicable
EPTV	Online Assembler	Changed	This segment has been moved into the CCUTIL CP CSECT.
FMTRA	FCTBG Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
FMTRB	FCTBG Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
FMTRC	FCTBG Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
FMTRD	FCTBG Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
FPTV	Online Assembler	Changed	This segment has been moved into the CCUTIL CP CSECT.
FTBD00	Offline C Language	New	Not Applicable
FTBD01	Offline C Language	New	Not Applicable
FTBD02	Offline C Language	New	Not Applicable
FTBD03	Offline C Language	New	Not Applicable
FTBD04	Offline C Language	New	Not Applicable
FTBD05	Offline C Language	New	Not Applicable
FTBD06	Offline C Language	New	Not Applicable
FTBD07	Offline C Language	New	Not Applicable
FTBD08	Offline C Language	New	Not Applicable
FTBD09	Offline C Language	New	Not Applicable
FTBD10	Offline C Language	New	Not Applicable
FTBD11	Offline C Language	New	Not Applicable
FTBD12	Offline C Language	New	Not Applicable
FTBD13	Offline C Language	New	Not Applicable
FTER00	Offline C Language	New	Not Applicable
FTGN00	Offline C Language	New	Not Applicable
FTPS00	Offline C Language	New	Not Applicable
FTPS01	Offline C Language	New	Not Applicable
FTPS02	Offline C Language	New	Not Applicable
FTPS03	Offline C Language	New	Not Applicable
FTPS04	Offline C Language	New	Not Applicable
FTPS05	Offline C Language	New	Not Applicable
FTPS06	Offline C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
FTPS07	Offline C Language	New	Not Applicable
FTPS08	Offline C Language	New	Not Applicable
FTRG01	Offline C Language	New	Not Applicable
FTRG02	Offline C Language	New	Not Applicable
FTRG03	Offline C Language	New	Not Applicable
FTRG04	Offline C Language	New	Not Applicable
FTRG05	Offline C Language	New	Not Applicable
FTRG06	Offline C Language	New	Not Applicable
FTRG07	Offline C Language	New	Not Applicable
FTRG08	Offline C Language	New	Not Applicable
FTTD00	Offline C Language	New	Not Applicable
FTVA00	Offline C Language	New	Not Applicable
FTVA01	Offline C Language	New	Not Applicable
FTVA02	Offline C Language	New	Not Applicable
FTVA03	Offline C Language	New	Not Applicable
GPTV	Online Assembler	Changed	This segment has been moved into the CCUTIL CP CSECT.
HPTV	Online Assembler	Changed	This segment has been moved into the CCUTIL CP CSECT.
IBMSVC	Online Assembler	Changed	This segment contains the IBM SVC table entries. CRESVCs are now coded in the IBMSVC segment.
IDSCFW	Online Assembler	Changed	This segment has been moved from the High Performance Option feature (HPO feature) of the TPF 3.1 system into the TPF 4.1 base.
IPAT	SIP Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
IPTV	Online Assembler	Changed	This segment has been moved into the CCUTIL CP CSECT.
JCD7	Real-Time	No Longer Supported	Not Applicable
JCD9	Real-Time	No Longer Supported	Not Applicable
JCW0	Real-Time	No Longer Supported	Not Applicable
JPTV	Online Assembler	Changed	This segment has been moved into the CCUTIL CP CSECT.
KPTV	Online Assembler	Changed	This segment has been moved into the CCUTIL CP CSECT.
MPTV	Online Assembler	Changed	This segment has been moved into the CCUTIL CP CSECT.
NPTV	Online Assembler	Changed	This segment has been moved into the CCUTIL CP CSECT.
OLDA	Real-Time	No Longer Supported	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
OLDC	Real-Time	No Longer Supported	Not Applicable
OLDD	Real-Time	No Longer Supported	Not Applicable
OLDE	Real-Time	No Longer Supported	Not Applicable
OLDF	Real-Time	No Longer Supported	Not Applicable
OLDH	Real-Time	No Longer Supported	Not Applicable
OLDJ	Real-Time	No Longer Supported	Not Applicable
OLDK	Real-Time	No Longer Supported	Not Applicable
OLDL	Real-Time	No Longer Supported	Not Applicable
OLDN	Real-Time	No Longer Supported	Not Applicable
OLDO	Real-Time	No Longer Supported	Not Applicable
OLDP	Real-Time	No Longer Supported	Not Applicable
OLDR	Online Assembler	Changed	In the TPF 3.1 system, this segment was written in assembler language. In the TPF 4.1, this segment has been written in the IBM C language.
OLDU	Real-Time	No Longer Supported	Not Applicable
OLD1	Real-Time	No Longer Supported	Not Applicable
OLD2	Real-Time	No Longer Supported	Not Applicable
OLD3	Real-Time	No Longer Supported	Not Applicable
OLD4	Real-Time	No Longer Supported	Not Applicable
OLD5	Real-Time	No Longer Supported	Not Applicable
OLD6	Real-Time	No Longer Supported	Not Applicable
OLD8	Real-Time	No Longer Supported	Not Applicable
OLD9	Real-Time	No Longer Supported	Not Applicable
OPMTBL	FCTBG Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
PIUPRT	Online Assembler	Changed	In the TPF 3.1 system, this segment was written in assembler language. In the TPF 4.1 system, this segment has been written in IBM C language.
PTVA	Real-Time	No Longer Supported	Not Applicable
PTVD	Real-Time	No Longer Supported	Not Applicable
PTVJ	Real-Time	No Longer Supported	Not Applicable
PTVM	Real-Time	No Longer Supported	Not Applicable
PTVQ	Real-Time	No Longer Supported	Not Applicable
PTVY	Real-Time	No Longer Supported	Not Applicable
RCTE	Real-Time	No Longer Supported	Not Applicable
RTTFLM	Real-Time	No Longer Supported	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
SALO	Online Assembler	Changed	In the TPF 3.1 system, this segment was written in assembler language. In the TPF 4.1 system, this segment has been written in IBM C language.
SPJPC1	Real-Time	No Longer Supported	Not Applicable
SPRIAT	Online Assembler	Changed	In the TPF 3.1 system, this was a SIP macro. In the TPF 4.1 system, this is sample code.
SYFCTB	FCTBG Generated (See Note 1.)	New	Not Applicable
SYMSEQ	SIP Generated (ACP.SYMACRO) (See Note 1.)	New	Not Applicable
SYPGMSET	SIP Generated (ACP.SYMACRO) (See Note 1.)	No Longer Supported	Not Applicable
SYSEQC	Online Assembler	Changed	In the TPF 4.1 system, the system equates are now produced by the file address compute program (FACE) table generator program (FCTBG). (The SYSEQC segment is found in ACP.SYMACRO.)
TPFARAPI	Online Assembler	Changed	This segment has been moved from the C feature of the TPF 3.1 system to the TPF 4.1 base.
UBDB	Real-Time Assembler	New	Not Applicable
UCS1	Real-Time Assembler	New	Not Applicable
UELA	Real-Time Assembler	Changed	This segment has been changed to SPARE slots within IBMPAL. If you use this segment, you need to define it within your own allocator decks (as defined in the INDSN macro of SIP Stage 1).
UELB	Real-Time Assembler	New	Not Applicable
UELC	Real-Time C Language	New	Not Applicable
UELD	Real-Time C Language	New	Not Applicable
UELE	Real-Time C Language	New	Not Applicable
UELF	Real-Time C Language	New	Not Applicable
UELG	Real-Time C Language	New	Not Applicable
UELH	Real-Time C Language	New	Not Applicable
UELL	Real-Time C Language	New	Not Applicable

Table 27. Changes to Segments (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
UELM	Real-Time C Language	New	Not Applicable
UELN	Real-Time C Language	New	Not Applicable
UELO	Real-Time C Language	Changed	This segment was changed to SPARE slots within IBMPAL. If you use this segment, you need to define it within your own allocator decks (as defined in the INDSN macro of SIP Stage 1).
UELP	Real-Time C Language	Changed	This segment was changed to SPARE slots within IBMPAL. If you use this segment, you need to define it within your own allocator decks (as defined in the INDSN macro of SIP Stage 1).
UELQ	Real-Time C Language	Changed	This segment was changed to SPARE slots within IBMPAL. If you use this segment, you need to define it within your own allocator decks (as defined in the INDSN macro of SIP Stage 1).
UELR	Offline C Language	New	Not Applicable
UELS	Real-Time C Language	Changed	This segment was changed to SPARE slots within IBMPAL. If you use this segment, you need to define it within your own allocator decks (as defined in the INDSN macro of SIP Stage 1).
UELT	Real-Time C Language	Changed	This segment was changed to SPARE slots within IBMPAL. If you use this segment, you need to define it within your own allocator decks (as defined in the INDSN macro of SIP Stage 1).
UELU	Real-Time C Language	New	Not Applicable
UELW	Real-Time C Language	New	Not Applicable
UELX	Real-Time C Language	New	Not Applicable
UEL1	Real-Time C Language	New	Not Applicable
UOLD	Real-Time	No Longer Supported	Not Applicable
UOP3	Real-Time Assembler	New	Not Applicable
UPER	Real-Time Assembler	New	Not Applicable
USR1	Offline Assembler	New	Not Applicable
USR2	Offline Assembler	New	Not Applicable
UVSN	Real-Time C Language	No Longer Supported	Not Applicable

In This Table:

- Note 1: See *TPF System Generation* for more information about this segment and the SIP library cross references.

Control Programs (CPs)

Table 28 summarizes the control program (CP) changes in the TPF 4.1 system.

Table 28. Changes to Control Programs (CPs)

Control Program (CP)	New, Changed, or No Longer Supported?	Description of Change
CCCCP2	Changed	CCCCP2 is always present in the TPF 4.1 system.
CCCTIN	Changed	CCTIN is now linked into the control program.
CCCWTN	New	CCCWTN is a new CSECT.
CCDCOL	New	CCDCOL is a new CSECT.
CCLANG	Changed	CCLANG is always present in the TPF 4.1 system.
CCSTOR	New	CCLANG is a new CSECT.
CCUTIL	New	CCUTIL is a new CSECT.

Control Program (CP) Copy Members

Table 29 summarizes the control program (CP) copy member changes in the TPF 4.1 system.

Table 29. Changes to Control Program (CP) Copy Members

CP Copy Member	New, Changed, or No Longer Supported?	CSECT Where the CP Copy Member is Located
CCW1	New	CCCWTN
CCW2	New	CCCWTN
CDC1	New	CCDCOL
CEFA	New	CCTAPE
CEFD	No Longer Supported	Not Applicable
CEFG	No Longer Supported	Not Applicable
CEFZ	New	CCTAPE
CFAC	New	CCDBAF
CIDP	New	CCCPSE
CJIE	New	CCSONS
CJIN	No Longer Supported	Not Applicable
CJIR	New	CCSONS
CJIW	New	CCSONS
CLHH	New	CCSTOR
CLHP	New	CCSTOR
CLHV	New	CCSTOR
CLRA	No Longer Supported	Not Applicable
CLRC	No Longer Supported	Not Applicable
CLRE	No Longer Supported	Not Applicable
CLRI	No Longer Supported	Not Applicable
CLRK	No Longer Supported	Not Applicable
CLRM	No Longer Supported	Not Applicable

Table 29. Changes to Control Program (CP) Copy Members (continued)

CP Copy Member	New, Changed, or No Longer Supported?	CSECT Where the CP Copy Member is Located
CLRO	No Longer Supported	Not Applicable
CLRQ	No Longer Supported	Not Applicable
CLRS	No Longer Supported	Not Applicable
CLRU	No Longer Supported	Not Applicable
CLRW	No Longer Supported	Not Applicable
CLRY	No Longer Supported	Not Applicable
CLSA	No Longer Supported	Not Applicable
CLSC	No Longer Supported	Not Applicable
CLSE	No Longer Supported	Not Applicable
CLSG	No Longer Supported	Not Applicable
CLSI	No Longer Supported	Not Applicable
CLSK	No Longer Supported	Not Applicable
CLSM	No Longer Supported	Not Applicable
CLSO	No Longer Supported	Not Applicable
CLTA	No Longer Supported	Not Applicable
CLTC	No Longer Supported	Not Applicable
CLUA	No Longer Supported	Not Applicable
CLUC	No Longer Supported	Not Applicable
CLUI	No Longer Supported	Not Applicable
CLVO	No Longer Supported	Not Applicable
CMDI	New	CCMCDL
CMIS	New	CCNUCL
CNOM	New	CCSICF
CPER	New	CCCPSE
CPSL	New	CCCPSE
CPSM	New	CCCPSE
CPSP	No Longer Supported	Not Applicable
CRTT	New	CCUTIL
CS0F	New	CCSNA4
CS9A	No Longer Supported	Not Applicable
CS9B	New	CCSNAF
CTIN	New	CCCTIN
CTSF	New	CCUTIL
CT38	New	CCCTIN
CT99	New	CCCTIN
CUDP	New	CCUEXT
LPTV	No Longer Supported	Not Applicable
UFZ0	New	CCNUCL

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs properly, you must establish the required operating environment. This chapter provides information about the minimum system configuration requirements necessary to operate the TPF 4.1 system, including:

- Hardware
- Software (programming requirements)
- Migrating from direct access storage device interprocessor communications (DASD IPC) to the Multi-Processor Interconnect Facility interprocessor communications (MPIF IPC).

Note: Some of the hardware or software products listed in this chapter may no longer be supported by IBM.

Hardware

This section contains information about the minimum hardware requirements necessary for operating the TPF 4.1 system. Additionally, the following are required:

- IBM ESA/370 or IBM ESA/390 for both the production systems and any IBM Virtual Machine (VM) system or Processor Resource/Systems Manager (PR/SM)-based test and production facilities
- Eight megabytes (8 MB) of main memory (also needed for a test system).

Note: Depending on your TPF 4.1 configuration, your results may vary.

Servers

This section discusses TPF 4.1 server support, as well as tightly coupled considerations and loosely coupled considerations for these servers.

Server Support

The TPF 4.1 system supports the following servers:

- IBM S/390 Parallel Transaction Servers (9672 E/P Models)
- IBM S/390 Parallel Enterprise Servers (9672 R Models)
- IBM S/390 Multiprise 2000 Server.

Tightly Coupled Considerations and Working Storage for These Servers

Tightly coupled considerations or working storage constraints are not unique to CMOS processors. The same considerations apply as they would for IBM 3090 or IBM ES/9000 systems. Because of the CMOS uniprocessor performance, you may give more thought to this than you might have otherwise.

Loosely Coupled Considerations for These Servers

For loosely coupled complexes, the 9672 model has the same requirements as IBM ES/9000 bipolar systems:

- Channel Redrive is required, which is activated by IMLing the processor in ESA TPF mode.

- Sysplex Timer attachment is required. For high availability Sysplex Timers, the dual port Sysplex Timer attachment card is required. For the 9672-EO1 model or the 9672-P01 model, the dual-port card is provided through RPQ 8P1656. The TOD-Sync RPQ is not supported.
- DASD control units require the limited lock facility (LLF) or concurrency filter lock facility (CFLF). If you have a coupling facility (CF), DASD control units do **not** require LLF or CFLF.

Storage Devices

This section discusses storage devices such as tape units and direct access storage devices (DASD) and DASD control units.

Tape Units

At least 4 tape units and 1 tape control unit are required by the TPF 4.1 system. The TPF 4.1 system supports all models of the following tape units and product features:

- Model 3480 Tape Unit and Model 3480 Control Unit
- Model 3490 Tape Unit and Model 3490 Control Unit.
- Model 3590 Tape Unit and Model 3590 Control Unit.

The preceding tape units and tape control unit models may provide the following product features:

- Improved Data Recording Capability (IDRC) feature
- Automatic Cartridge Loader feature (manual or automatic modes only), which maximizes your efficiency in automatic tape mounting
- Dual Control Unit Communications Coupler feature
- Multipathing
- IBM 3480 Model 2 XF Format (written and read by 3490E devices)
- IBM Enterprise Systems Connection (ESCON) channel adapter
- Enhanced Capacity Cartridge System Tape
- First-in-first-out (FIFO) control unit buffer recovery.

Notes:

1. The Model 3420 tape unit and associated 3803 control units are no longer supported.
2. The Models 3480 and 3490 tape units need at least a licensed internal code level 991862 (equivalent to A47862).
3. Model 3480 tape units do not support FIFO control unit buffer recovery. Model 3490 tape units require licensed internal code C34668K and Model 3490E tape units require licensed internal code C05568K to support FIFO control unit buffer recovery.

Tape Libraries

The TPF 4.1 system supports the following tape libraries:

- 3494 Tape Library
- 3495 Tape Library
- Magstar Virtual Tape Server (3494-B16 and 3494-B18).

Direct Access Storage Devices (DASD) and DASD Control Units

The TPF 4.1 system supports the following DASD and DASD control units:

- IBM 3350 Direct Access Storage Facility (native mode only)
- IBM 3375 Direct Access Storage Facility

- IBM 3380 Direct Access Storage Facility
- IBM 3380 CJ2 Storage Control
- IBM 3390 Models 1, 2, and 3 Direct Access Storage Device (native and emulation modes)
- IBM 3880 Models 1, 2, and 3 Storage Control
- IBM 3880 Model 23 Storage Control with the 8B0035 Record Cache RPQ
- IBM 3990 Models 1 and 2 Storage Control
- IBM 3990 Model 3 Storage Control with the Record Cache Buffer Emulation RPQ (single central processing complex (CPC) environment)
- IBM 3990 Model 3 Storage Control with the Record Cache Buffer Emulation RPQ and Limited Lock Facility/Microcode Static Switch RPQ (loosely coupled environment)
- IBM 3990 Model 3 Storage Control with the Record Cache RPQ (single central processing complex (CPC) environment)
- IBM 3990 Model 3 Storage Control with the Record Cache and Limited Lock Facility/Microcode Static Switch RPQ (loosely coupled environment)
- IBM 3990 Model 3 Storage Control with the Multi-Path Record Cache RPQ
- IBM 3990 Model 6 with Record Cache and Multi-Path Lock Facility (MPLF)
- IBM 9345 Direct Access Storage Device subsystem, direct attach (single CPC environment)
- IBM 9390 Models 1 and 2 Storage Control
- IBM Enterprise Storage Server (ESS) Model 2105 (3990 Model 3 TPF mode)
- IBM RAMAC Array DASD Models 9391 and 9392
- IBM RAMAC Array Subsystem Models 9394 and 9395.

Notes:

1. The TPF 4.1 system requires at least 2 DASD devices and 1 DASD control unit.
2. Models 3880 or 3990 require the limited lock facility (LLF) or the concurrency filter lock facility (CFLF) when part of a loosely coupled complex. If you have a coupling facility (CF), DASD control units **do not** require LLF or CFLF.

Unit Record Devices

The TPF 4.1 system supports the following unit record devices:

- IBM 4248 Impact Line Printer Model 2 in 3211 emulation mode
- IBM 3505 Card Reader.

Interconnection Devices

The TPF 4.1 system supports the following interconnection devices:

- IBM 3088 Multisystem Channel Communication Unit (all models), which provides for interprocessor communications (IPC) over block multiplexer channels.
- IBM 3737 Remote Channel-to-Channel Unit Model 1, which allows IBM System/390 host systems to communicate with each other through public or private T1 facilities.
- IBM 9032 Enterprise Systems Connection Director (ESCD) Model 2, which provides for connectivity and switching among IBM Enterprise Systems Connection (ESCON) channels and control units. At least one IBM 9032 ESCD Model 2 port should be connected to an IBM MVS/ESA or IBM VM/ESA system for device support.

- IBM 9033 Enterprise Systems Connection Director (ESCD) Model 1, which provides connectivity and switching among ESCON channels and control units. At least one IBM 9033 ESCD Model 1 port should be connected to an IBM MVS/ESA or IBM VM/ESA system for device support.
- One IBM 9034 ESCON Converter Model 1 attached to 1 input/output (I/O) device with parallel channel adapters to ESCON channels. You can have more than one IBM 9034 ESCON Converter Model 1 to I/O device attachment in your complex.
- IBM 9035 ESCON Converter Model 2, which allows IBM 3990 Model 2 device units with ESCON adapters to be attached to parallel channels. The IBM 9035 provides a migration path to the ESCON architecture environment without modifying the processor or the application software in most cases.

Control Units

This section provides information about the types of devices and control units that the TPF 4.1 system supports:

- Communication controllers
- Terminal interchange and control units.

Communication Controllers

Table 30 shows the communication controllers that the TPF 4.1 system supports.

Table 30. Communication Controllers Supported by the TPF 4.1 System

Controller	Notes
IBM 3172 Model 3	IBM TCP/IP Offload program must be installed.
IBM 3705	Applicable for synchronous link control (SLC) only.
IBM 3725	Locally attached VTAM CMC is a prerequisite.
IBM 3745	
IBM 3746	Connectivity subsystem for Enterprise Systems Connection (ESCON) support.
Open Systems Adapter (OSA)-Express Card	Use with Gigabit Ethernet (GbE) or Fast Ethernet (FENET) adapter.

Terminal Interchange (TI) and Control Units

The TPF 4.1 system supports the following terminal interchange and control units:

- IBM 1971 Terminal Control Unit
- IBM 2946-4 Terminal Control Subsystem
- IBM 2948 Display Terminal Interface
- IBM 3174 Control Unit Models 1L and 11L
- IBM 3174 Control Unit Model 151R
- IBM 3271 Control Unit Models 11 and 12
- IBM 3274 Control Unit Models 1B and 1C
- IBM 3276 Control Unit/Display Station Models 11 and 12
- IBM 3601, 3602 Finance Communication Controllers with attached devices
- IBM 3614, 3624 Consumer Transaction Facility
- IBM 4700 Finance Communication Controllers with attached devices

Note: The IBM 4700 is supported as a 3600 controller.

- 8100 DSC Information System
- SLU Type P must be a cross-domain resource (includes 3600, 4700, 8100, AS/400, IMS/VS, and CICS/VS).

Note: VTAM CMC is not required for emulation program (EP) support.

Terminals and Display Devices

The TPF 4.1 system supports the following terminals and display devices:

- IBM 1977-1 Terminal Unit
- IBM 1980-21/24 Terminal Printers
- IBM 2915-3 Display Terminal
- IBM 3179-1 Display Station
- IBM 3277 and 3278 Display Stations
- IBM 3279 Display Station
- IBM 3290 Display Station, single port
- IBM 3284, 3286, 3287, and 3289 Printers
- IBM 4505 Video Display
- IBM 5150 PC, 5160 XT, 5170 AT
- IBM 5271-3270 PC.

Consoles

The TPF 4.1 system requires one system console and supports the following consoles:

- IBM Extended Operations Console Facility/2 (EOCF/2) channel attached with an IBM MicroChannel to Mainframe Connection (MMC) card for IBM 3215 and 3270 console support
- IBM 3036-1 Console
- IBM 3191 Display Station (with the 4224 Printer)
- IBM 3210-1 Console Printer-Keyboard
- IBM 3215 Console Printer-Keyboard
- IBM 3277 Display Station (with the 328x Printer)
- IBM 3278-IIA Display Station (with the 328x Printer).

Central Processing Complexes (CPCs)

Table 31 shows the central processing complexes (CPCs) that the TPF 4.1 system supports and whether there is loosely coupled processing support for them. If loosely coupled processing is supported, the table also provides the processor Requests for Price Quotations (RPQs) that are required.

Table 31. Central Processing Complexes (CPCs) and Loosely Coupled Support

Central Processing Complex (CPC)	Loosely Coupled	Clock Sync Support	Channel Redrive Support
IBM 3090 Models 120E, 150E	No		
IBM 3090 Models 180E, 200E, 280E, 300E, 400E, 500E, 600E	Yes	RPQ 8P1189	RPQ 8P1189
IBM ES/3090 Models 110J, 120J, 150J, 170J, 250J	No		
IBM ES/3090 Models 180J, 200J, 280J, 300J, 380J, 400J, 500J, 600J	Yes	RPQ 8P1189 Sysplex Timer (STR)	RPQ 8P1189 RPQ 8P1441
IBM ES/3090 Models 170JH, 250JH	No		
IBM ES/3090 Models 100S, 120S, 150S, 170S, 250S	No		

Table 31. Central Processing Complexes (CPCs) and Loosely Coupled Support (continued)

Central Processing Complex (CPC)	Loosely Coupled	Clock Sync Support	Channel Redrive Support
IBM ES/3090 Models 180S, 200S, 280S, 300S, 380S, 400S, 500S, 600S	Yes	RPQ 8P1189	RPQ 8P1189
IBM ES/3090-9000T Models 15T, 17T, 18T, 25T, 28T	Yes	Sysplex Timer (STR)	See Note 1.
IBM ES/9000 9021 Model 330	Yes	Sysplex Timer (STR)	See Note 1.
IBM ES/9000 9021 Models 340, 500, 580, 620, 720	Yes	RPQ 8P1189	RPQ 8P1189
		Sysplex Timer (STR)	FC 9593/1593
IBM ES/9000 9021 Models 520, 640, 660, 711, 740, 820, 821, 822, 831, 860, 900, 941, 942, 952, 962, 972, 982, 9x2	Yes	Sysplex Timer (STR)	FC 9593/1593
IBM ES/9000 9121 (All Models)	Yes	Sysplex Timer (STR)	RPQ 8P1189
IBM ES/9221 Models 191, 201, 211, 221, 421	No		
IBM Parallel Servers 9672	Yes	Sysplex Timer (STR)	Standard
Notes: 1. Before adding a system that does not support channel redrive in a loosely coupled complex, input/output (I/O) configurations and I/O loads should be analyzed to project effective performance. 2. In this table, a Yes printed in the Loosely Coupled column indicates that the CPCs may participate in a loosely coupled processor complex when all required RPQs or feature codes (FC) are installed. A No printed in the Loosely Coupled column indicates that the required features or RPQs are not available for the CPCs and they cannot participate in a loosely coupled environment.			

Requests for Price Quotations (RPQs) and Product Features for Central Processing Complexes (CPCs)

Table 32 provides a brief description of the Requests for Price Quotations (RPQs) and product features that are required for the various central processing complexes (CPCs) for the TPF 4.1 system.

Table 32. Requests for Price Quotations (RPQs) and Product Features for Central Processing Complexes (CPCs)

RPQ/Product Feature	Description
Sysplex Timer (STR)	<p>The IBM 9037 Sysplex Timer (STR) is a common time source for clock synchronization across central processing complexes (CPCs). It is part of the IBM Enterprise Systems Connection (ESCON) Architecture.</p> <p>STR and RPQ 8P1189 are mutually exclusive.</p> <p>Note: Time-of-Day (TOD) Synchronization Compatibility (TSC) Hardware (RPQ 8K1731) provides the ability to operate the TOD RPQ (RPQ 8P1189) CPCs and STR CPCs in the same loosely coupled complex.</p>
TOD Clock Sync	<p>This RPQ synchronizes the time-of-day (TOD) clocks in a loosely coupled complex.</p> <p>Note: TOD Synchronization Compatibility (TSC) Hardware (RPQ 8K1731) is required when there are TOD RPQ (RPQ 8P1189) central processing complexes (CPCs) and Sysplex Timer (STR) CPCs in the same loosely coupled complex.</p>

Table 32. Requests for Price Quotations (RPQs) and Product Features for Central Processing Complexes (CPCs) (continued)

RPQ/Product Feature	Description
8P1189	<p>For the IBM 3090 and IBM ES/9000 9021 models, the TPF Enabler RPQ provides the following functions:</p> <ul style="list-style-type: none"> • Channel Redrive • Time-of-Day (TOD) Clock Synchronization. <p>For the IBM ES/9000 9121 models, the TPF Enabler RPQ provides the Channel Redrive function.</p> <p>In a loosely coupled environment, when TPF Enabler RPQ 8P1189 is active and multipathing is used, the central processing complex (CPC) must be an IBM ES/3090 Model S at SEC 852 or later SEC level, an IBM ES/3090 Model J or later model, or an IBM ES/9000 9021 model or 9121 model.</p>
8P1269	<p>For the IBM ES/3090 and IBM ES/9000 9021 models, the TPF Enabler RPQ is required to run the TPF 4.1 system on the B side of any processor that can be physically partitioned. RPQ 8P1189 is a prerequisite for this RPQ.</p> <p>Note: RPQ 8P1269 is not applicable to the IBM ES/9000 9121 models.</p>
8P1441	This is the Channel Redrive RPQ for selected models of the IBM ES/3090 Model J.
9021 (FC 9593/1593)	The TPF ESA (Channel Redrive) Enabler.

Single Central Processing Complex (CPC) Environment

Table 33 on page 192 summarizes the IBM 3380 and IBM 3390 direct access storage device (DASD) models that are supported by various control units and Requests for Price Quotations (RPQs) in only a single central processing complex (CPC) environment.

Notes:

1. These control units and RPQs are **not** supported in a loosely coupled environment.
2. Multipathing is supported in the TPF 4.1 system in a single CPC environment and only on the configurations shown in Table 33.

Table 33 also provides information for those who have not previously installed any 3990 RPQs or functions. These are called new installation RPQs or functions. If you have already installed one of the new installation RPQs or functions and would like to convert to a different new installation RPQ or function, conversion RPQs are available. For more information about the new installation RPQs or functions and the conversion RPQs, see *3990 Transaction Processing Facility Support RPQs*.

Table 33. New Installation RPQs or Functions. IBM 3380 and 3390 DASD and control units supported by the TPF 4.1 system in a single central processing complex (CPC) environment.

[illegible]

Loosely Coupled Complex

In a loosely coupled complex for the TPF 4.1 system:

- Clock synchronization is required and can be achieved with any of the following:
- Transaction Processing RPQ 8P1189
- Sysplex Timer (STR).
- Channel Redrive is required except where noted in Table 31 on page 189. Channel Redrive allows the channels to redrive start subchannel (SSCH) instructions that failed because of device or control unit busy conditions. Channel Redrive is recommended for tightly coupled TPF environments to achieve the announced performance.

Table 34 on page 194 summarizes which IBM 3380 and IBM 3390 models are supported by various control units and RPQs in a loosely coupled complex. In addition, Table 34 provides information for those who have not previously installed any 3990 RPQs. These are called new installation RPQs. If you have already installed one of the new installation RPQs and would like to convert to a different new installation RPQ, conversion RPQs are available. For more information about new installation RPQs and conversion RPQs, see *3990 Transaction Processing Facility Support RPQs*.

Note: Multipathing is supported in a loosely coupled environment with the multi-path lock facility (MPLF) RPQ attached.

Table 34. New Installation RPQs. IBM 3380 and 3390 DASD and control units supported by the TPF 4.1 system in a loosely coupled complex.

Control Unit	Required Requests for Price Quotations (RPQs)	IBM 3380 Model					IBM 3390 Model			IBM RAMAC Array DASD	
		A	D	E	J	K	1	2	3	9392	9395
IBM 3880 Model 3	MM2741 Airline Buffer and Extended Limited Lock Facility (ELLF), and Speed Matching Buffer Feature. (This RPQ does not support general files or general data sets (GDSs).) The Static Switch RPQ is also required: MR0352 for the IBM 3380 Model AA4.	X									
IBM 3880 Model 3	8S0026 Extended Limited Lock Facility (ELLF). The Static Switch RPQ is also required: MR0352 for the IBM 3380 Model AA4.	X									
IBM 3880 Model 3	8B0050 Extended Limited Lock Facility (ELLF). The Static Switch RPQ is also required: MR0352 for the IBM 3380 Model AA4 or 8S0141 for the IBM 3380 Model AD4/AE4.	X	X	X							
IBM 3880 Model 23	8B0035 Record Cache and Extended Limited Lock Facility (ELLF). The Static Switch RPQ is also required: MR0352 for the IBM 3380 Model AA4 or 8S0141 for the IBM 3380 Model AD4.	X	X								
IBM 3990 Model 2	8B0071 Extended Limited Lock Facility (ELLF) and Microcode Static Switch (MSS).	X	X	X	X	X					
IBM 3990 Model 2	8B0150 Limited Lock Facility (LLF) and Microcode Static Switch (MSS).	X	X	X	X	X	X	X			
IBM 3990 Model 3	8B0077 Record Cache Buffer Emulation with Extended Limited Lock Facility (ELLF) and Microcode Static Switch (MSS). (This RPQ does not support general files or general data sets.)	X	X	X	X	X					
IBM 3990 Model 3	8B0079 Record Cache Buffer Emulation with Extended Limited Lock Facility (ELLF) and Hardware Static Switch. (This RPQ does not support general files or general data sets.)	X	X	X							
IBM 3990 Model 3	8B0156 Record Cache Buffer Emulation with Limited Lock Facility (LLF) and Microcode Static Switch (MSS). (This RPQ does not support general files or general data sets.)	X	X	X	X	X	X	X			
IBM 3990 Model 3	8B0159 Record Cache RPQ with Limited Lock Facility (LLF) and Microcode Static Switch (MSS).	X	X	X	X	X	X	X			
IBM 3990 Model 3	8B0178 Record Cache RPQ with Multi-Path Lock Facility (MPLF).						X	X	X		
IBM 3990 Model 3	8B0179 Record Cache RPQ with Multi-Path Lock Facility (MPLF) and 3380 Record Format.						X	X	X		

Table 34. New Installation RPQs (continued). IBM 3380 and 3390 DASD and control units supported by the TPF 4.1 system in a loosely coupled complex.

		IBM 3380 Model					IBM 3390 Model			IBM RAMAC Array DASD	
Control Unit	Required Requests for Price Quotations (RPQs)	A	D	E	J	K	1	2	3	9392	9395
IBM 3990 Model 6	Using Record Cache with Multi-Path Lock Facility (MPLF).						X	X	X	X	

High Performance Option (HPO) Feature

To run in a loosely coupled complex under the High Performance Option (HPO) feature, Multi-Processor Interconnect Facility interprocessor communications (MPIF IPC) is required because direct access storage device interprocessor communications (DASD IPC) is no longer supported. The hardware needed is:

- Model 3088, or
- IBM Enterprise Systems Connection (ESCON) Channel-to-Channel (CTC).

See “Migrating from DASD IPC to MPIF IPC” on page 202 for more information.

Software (Programming Requirements)

This section contains information about the minimum software requirements necessary for operating the TPF 4.1 system.

OS/390 or MVS Requirements

- IBM MVS/DFP Version 3 Release 3 or later releases or IBM MVS/ESA Version 4.2 or later releases is required for virtual storage access method (VSAM) database support.
- Either an IBM OS/390, IBM MVS/XA or IBM MVS/ESA system is required for offline batch and utility functions.

C and C++ Compiler Requirements

The TPF 4.1 system now ships all ISO-C load modules with each program update tape (PUT) to eliminate the need for having the proper level compiler available to build the PUT. You can continue to compile all of your existing user-written applications using your existing compiler. The only code affected by the compiler upgrade is IBM system code.

If you do not have any modifications to the ISO-C load modules shipped by IBM, you can take the ISO-C load modules shipped on the PUT and load to them to your TPF 4.1 system without any impact. If you do have modifications to the ISO-C load modules shipped by IBM and the ISO-C load modules do not contain any code that is object code only, you can continue to use your current compiler to build those ISO-C load modules; however, you must understand that IBM is not compiling or testing the code shipped on the PUT using the compiler level you may have, so IBM recommends that you stay current with the compiler level for each PUT to avoid any compiler-related problems.

Table 35 on page 197 outlines the different compiler levels used for each PUT. Small programming enhancements (SPEs) shipped on the more recent PUTs require functions from a specific C and C++ compiler level. As new versions of these compilers are required, support for the older compilers are dropped. To install the later C and C++ compilers, updated versions of IBM OS/390 are required. For example, IBM OS/390 Version 2 Release 4 is required to run the IBM OS/390 C/C++ Version 2 Release 4 compiler.

To use this table, locate the PUT level applied to your TPF 4.1 system; the C and C++ compiler supported by that PUT is found to the right of the PUT level. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers.

Table 35. C and C++ Compilers Supported by PUT

PUT Level	Compiler	System Support Compiler
PUT 2 through PUT 4	IBM SAA AD/Cycle C/370 Compiler Version 1 Release 2. IBM SAA AD/Cycle Language Environment (LE/370) Version 1 Release 3. IBM SAA AD/Cycle Language Environment (LE/370). IBM SAA AD/Cycle C/370 Compiler Version 2 Release 1. IBM SAA AD/Cycle C/370 Compiler Version 3 Release 1.	Not Applicable
PUT 5	IBM C/C++ for MVS/ESA Version 3 Release 1 (C/MVS compiler component only) compiler.	Not Applicable
PUT 6 through PUT 8	IBM C/C++ for MVS/ESA Version 3 Release 2 compiler. IBM OS/390 C/C++ Version 1 Release 2 compiler. IBM OS/390 C/C++ Version 1 Release 3 compiler.	Not Applicable
PUT 9	IBM OS/390 C/C++ Version 2 Release 4 compiler or later release.	Not Applicable
PUT 10	IBM OS/390 C/C++ Version 2 Release 4 compiler or later release.	Not Applicable
PUT 11	IBM OS/390 C/C++ Version 2 Release 6 compiler or later release.	Not Applicable
PUT 12	IBM OS/390 C/C++ Version 2 Release 8 compiler or later release.	Not Applicable
PUT 13	IBM OS/390 C/C++ Version 2 Release 9 compiler or later release.	Not Applicable
PUT 14	IBM OS/390 C/C++ Version 2 Release 10 compiler.	IBM OS/390 C/C++ Version 2 Release 10
PUT 15	IBM OS/390 C/C++ Version 2 Release 10 compiler.	IBM OS/390 C/C++ Version 2 Release 10 IBM z/OS Version 1 Release 1
PUT 16	IBM OS/390 C/C++ Version 2 Release 10 compiler.	IBM OS/390 C/C++ Version 2 Release 10 IBM z/OS Version 1 Release 1 IBM z/OS Version 1 Release 2

Note: The TPF 4.1 system does not support the XPLINK compiler option.

SNA-Based Communication Requirements

For Systems Network Architecture (SNA)-based communication with remote users (terminal and application programs), the TPF 4.1 system requires channel-attached controllers. Channel-to-channel (CTC) or Enterprise Systems Connection (ESCON) CTC can also be used for communication between the TPF 4.1 system and adjacent hosts.

PU 5 Communication Requirements

Connecting the TPF 4.1 system as a PU 5 node to the SNA network requires channel-attached IBM 3745 Communications Controllers. The TPF 4.1 system can also be channel-attached to IBM 3746 Model 900 (3746-900) Communications Controllers, which are connected to an IBM 3745. IBM ACF/VTAM or OS/390 is also required to load and manage the IBM 3745 Communication Controllers.

CTC or ESCON CTC can also be used for communication between the TPF 4.1 system and adjacent hosts.

APPN Communication Requirements

Connecting the TPF 4.1 system as an Advanced Peer-to-Peer Networking (APPN) node to the SNA network requires channel-attached routers that support the channel data link control (CDLC) protocol, such as:

- IBM 3745 Communications Controllers running IBM ACF/NCP Version 6 Release 2 or later release. IBM ACF/VTAM Version 4 Release 1 or later release, or OS/390 is also required to load and manage the IBM 3745 Communications Controllers.
- IBM 3746 Model 900 (3746-900) or Model 950 (3746-950) Communications Controllers
- IBM RS/6000 with the SNA feature installed.

HPR Communications Requirements

Connecting the TPF 4.1 system as a high-performance routing (HPR) node to the SNA network requires channel-attached routers that support the CDLC protocol and the HPR automatic network routing (ANR) feature, such as:

- IBM 3745 Communications Controllers running IBM ACF/NCP Version 7 Release 1 or later release. IBM ACF/VTAM Version 4 Release 3 or later release, or OS/390 is also required to load and manage the IBM 3745 Communications Controllers.
- IBM 3746 Model 900 (3746-900) or Model 950 (3746-950) Communications Controllers.

X.25 Communication Requirements

Connecting the TPF 4.1 system to remote X.25 devices requires channel-attached IBM 3745 Communications Controllers with the IBM NPSI or IBM FTPI feature installed. IBM ACF/VTAM or OS/390 is also required to load and manage the IBM 3745 Communications Controllers.

ALC Communication Requirements

Connecting the TPF 4.1 system to remote airlines line control (ALC) devices requires channel-attached IBM 3745 Communications Controllers with the IBM Airlines Line Control Interconnectoin (ALCI) feature installed. ALCI requires that the 3745 be equipped with the appropriate RPQs and Licensed Internal Code (LIC) level for ALC. See “3745 ACF/NCP RPQs by Protocol” on page 201 for information about the required RPQs and LIC level. IBM ACF/VTAM or OS/390 is also required to load and manage the IBM 3745 Communications Controllers.

TCP/IP-Based Communication Requirements

The TPF 4.1 system can connect to Transmission Control Protocol/Internet Protocol (TCP/IP) networks through TCP/IP offload support or TCP/IP native stack support.

TCP/IP Offload Support

TCP/IP offload support requires one of the following:

- An IBM 3172 Model 3 Interconnect Controller with the IBM 3172 Offload Feature installed. The IBM 3172 Model 3 Interconnect Controller can be attached to the TPF 4.1 system using either a parallel channel adapter or an Enterprise Systems Connection (ESCON) channel adapter.
- A Cisco 7500 series router.

See the following for more information about TCP/IP offload support:

- “Programming Request for Price Quotation (PRPQ) for TCP/IP Support” on page 201 for information about ordering programming request for price quotations (PRPQs) for TCP/IP offload support
- *TPF Migration Guide: Program Update Tapes* for more information about TCP/IP offload support provided with program update tape (PUT) 4 and Transmission Control Protocol/Internet Protocol full-duplex socket support provided with program update tape (PUT) 5.

TCP/IP Native Stack Support

With TCP/IP native stack support, the TPF 4.1 system can connect to the following devices:

- IBM 3745 Communications Controller with IBM NCP Version 7 Release 2 or later release.
- IBM 3746 Model 900 (3746-900) or Model 950 (3746-950) Communications Controller with the IP feature installed.
- Open Systems Adapter (OSA)-Express card.

Non-SNA-Based Communication Requirements

To use the binary synchronous communications (BSC) protocol, a 3745 partitioned emulation program (PEP) and emulation program (EP) Version 6 Release 1 or later release with IBM NCP Version 7 Release 1 or later release is required.

To use the synchronous link control (SLC) protocol, the emulation program (EP Version 3 Release 1 or later release) in the 3705 Communication Controller is required.

Miscellaneous Requirements

- IBM High-Level Assembler Version 1 Release 1 or Version 1 Release 2 or higher for IBM MVS, IBM VM, and IBM VSE (5696-234) systems is required for TPF 4.1 program assemblies.

Note: IBM program services for Version 1 Release 1 are available only until December 29, 1995. At that time, only IBM High-Level Assembler Version 1 Release 2 or higher will be supported.

- The PL/1 Optimizing Compiler & Libraries (5668-910) is required for compilation of TPF 4.1 data reduction, offline pool utilities, and directory generation programs.
- STLport Standard Template Library Version 3.01 compiled with the IBM OS/390 C/C++ Version 2 Release 4 compiler.

TPF 4.1 Product Information Requirements

You can access all TPF product information in Hypertext Markup Language (HTML) format and Portable Document Format (PDF) from the IBM TPF Product Information Center. The IBM TPF Product Information Center is available from the TPF Web site (go to <http://www.ibm.com/tpf/pubs/tpfpubs.htm>) and the *IBM TPF Product Information Center* CD-ROM. Although IBM encourages you to use an information

source that best matches your working style and environment, the IBM TPF Product Information Center is the preferred information source. **You will always find the most recent version of the TPF product information on the TPF Web site.** See *TPF Library Guide* for more information about the IBM TPF Product Information Center.

The IBM TPF Product Information Center has been tested on the Microsoft Windows 2000 and Windows NT operating systems using Microsoft Internet Explorer browser version 5.0 or later. If you are using Microsoft Internet Explorer browser version 5.0 with service pack 2 or later, use Adobe Acrobat Reader 5.0 to avoid experiencing difficulties with PDFs.

PDF and HTML Format

The TPF 4.1 books are available in portable document format (PDF) and hypertext markup language (HTML) format at: <http://www.ibm.com/tpf/>

Follow the instructions provided to view or print the books.

Requests for Price Quotations (RPQs) and Programming Requests for Price Quotations (PRPQs) by Protocol

This section provides information about Requests for Price Quotations (RPQs) and Programming Requests for Price Quotations (PRPQs), by protocol.

3705 EP/VS RPQs by Protocol

Table 36 shows the 3705 EP/VS RPQs, by protocol, that are supported by the TPF 4.1 system.

Table 36. 3705 EP/VS RPQs, by Protocol, Supported by the TPF 4.1 System

Protocol	RPQs Supported
Synchronous Link Control (SLC)	<ul style="list-style-type: none">• Link Control FDX IATA PRPQ 85027; one for each 3705 (3705-I only)• 3705 feature 1541 or 1544 Channel Adapter, Type 1 or 4 only• 3705 feature 1642, Communication Scanner Type 2 only• 3705 feature 4714 or 4718, Line Set Type 1D or 1H, one for each FDX line

3720 ACF/NCP RPQs by Protocol

Table 37 shows the 3720 ACF/NCP RPQs, by protocol, that are supported by the TPF 4.1 system.

Table 37. 3720 ACF/NCP RPQs, by Protocol, Supported by the TPF 4.1 System

Protocol	RPQs Supported
Airlines Line Control (ALC)	<ul style="list-style-type: none">• RPQ 7L1095• LC Expansion Unit 5971-L02

3725 ACF/NCP/VS RPQs by Protocol

Table 38 on page 201 shows the 3725 ACF/NCP/VS RPQs, by protocol, that are supported by the TPF 4.1 system.

Table 38. 3725 ACF/NCP/VS RPQs, by Protocol, Supported by the TPF 4.1 System

Protocol	RPQs Supported
Airlines Line Control (ALC)	<ul style="list-style-type: none"> • PRPQ 5799-CDX NEF2 • RPQs 8Q0407 and 8Q0408 • IBM 3725 Communications Controller

3745 ACF/NCP RPQs by Protocol

Table 39 shows the 3745 ACF/NCP RPQs, by protocol, that are supported by the TPF 4.1 system.

Table 39. 3745 ACF/NCP RPQs, by Protocol, Supported by the TPF 4.1 System

Protocol	RPQs Supported
Airlines Line Control (ALC)	<ul style="list-style-type: none"> • RPQ 7L1092 • ALC Scanner

Programming Request for Price Quotation (PRPQ) for TCP/IP Support

You must order PRPQ 5799-QWZ to obtain the software for the IBM 3172 Offload Feature mentioned in “TCP/IP-Based Communication Requirements” on page 198. Call TPF Systems to order PRPQ 5799-QWZ.

Table 40. Programming Request for Price Quotation (PRPQ) for TCP/IP Support

PRPQ and Product Feature	Description								
5799-QWZ for TCP/IP Support	<p>Contains the following features:</p> <table> <tr> <th>Feature Number</th><th>Description</th></tr> <tr> <td>9001</td><td>Asset registration on the TPF 4.1 system.</td></tr> <tr> <td>4003</td><td>IBM 3172 Offload Feature.</td></tr> <tr> <td>5805</td><td> <p>The TPF TCP/IP Offload program (shipped on diskettes), which is preloaded when you specify feature number 4003 when ordering. In addition, you will receive the following books:</p> <ul style="list-style-type: none"> • <i>TPF Transmission Control Protocol/Internet Protocol</i> • <i>TCP/IP for MVS: Offloading TCP/IP Processing, Version 3, Release 1.</i> </td></tr> </table>	Feature Number	Description	9001	Asset registration on the TPF 4.1 system.	4003	IBM 3172 Offload Feature.	5805	<p>The TPF TCP/IP Offload program (shipped on diskettes), which is preloaded when you specify feature number 4003 when ordering. In addition, you will receive the following books:</p> <ul style="list-style-type: none"> • <i>TPF Transmission Control Protocol/Internet Protocol</i> • <i>TCP/IP for MVS: Offloading TCP/IP Processing, Version 3, Release 1.</i>
Feature Number	Description								
9001	Asset registration on the TPF 4.1 system.								
4003	IBM 3172 Offload Feature.								
5805	<p>The TPF TCP/IP Offload program (shipped on diskettes), which is preloaded when you specify feature number 4003 when ordering. In addition, you will receive the following books:</p> <ul style="list-style-type: none"> • <i>TPF Transmission Control Protocol/Internet Protocol</i> • <i>TCP/IP for MVS: Offloading TCP/IP Processing, Version 3, Release 1.</i> 								

IBM Extended Operations Console Facility/2 (EOCF/2) and IBM Transaction Processing Facility Database Facility (TPFDF)

This section contains the minimum software requirements for using IBM Extended Operations Console Facility/2 (EOCF/2) and IBM Transaction Processing Facility Database Facility (TPFDF) products with the TPF 4.1 system:

- For the IBM EOCF/2 product, you must have EOCF/2 Corrective Service Diskette 2 (CSD2) or later release installed. CSD2 supports IBM Operating System/2 (OS/2) Version 2.1 as well as the new message formats for the TPF 4.1 system.
- For the IBM TPFDF product, you must have program update tape (PUT) 2 or later release installed.
- For the Distributed Data Access (DDA) feature of the IBM TPFDF product, you must have authorized program analysis report (APAR) PN49945 installed.

Interprocessor Communications for the High Performance Option User

Before this release, the TPF system used two methods of interprocessor communications (IPC):

- DASD IPC (using the extended limited lock facility (ELLF), known previously as the System Interprocessor Communications Facility (SICF))
- MPIF IPC (using a channel-to-channel communication link).

Beginning with this release, DASD IPC is no longer supported. The TPF system supports IPC only through the Multi-Processor Interconnect Facility (MPIF) feature, which provides all of the function of DASD IPC with more throughput. MPIF IPC was changed and restructured.

You can use the new TYPE parameter of the SIPCC macro to specify an interprocessor communications (IPC) or inter-I-stream communication (IS) type of processing. Inter-I-stream communication lets you direct messages to I-streams on particular processors.

MPIF is now a required feature when using the High Performance Option (HPO) feature.

Migrating from DASD IPC to MPIF IPC

If you are using direct access storage device interprocessor communications (DASD IPC), which is **not** supported in the TPF 4.1 system, you must migrate to the Multi-Processor Interconnect Facility interprocessor communications (MPIF IPC).

To Migrate to MPIF IPC

1. Install the MPIF feature by coding

```
MPIF=YES
```

on the CONFIG macro, add RAMFIL statements for the #CB8HD and #PDREC record types, and run SIP.

2. Install a channel-to-channel device, such as a Model 3088 or IBM Enterprise Systems Connection (ESCON) Channel-to-Channel (CTC).
3. Define your MPIF complex, paths, devices, and so on, using the ZMPIF command.

See *TPF Operations* for more information about the ZMPIF command.

To make testing and debugging easier, you can migrate from DASD IPC to MPIF IPC on a TPF 3.1 system.

Changes to application programs are not required.

Generating the TPF 4.1 System

This chapter describes changes you must make in the TPF 4.1 system generation and initialization.

The following list summarizes the system generation changes you must make to migrate to the TPF 4.1 system:

- Removing all system initialization program (SIP) macros that are no longer supported from your SIP Stage I deck, and review changes to all SIP macros and skeletons summarized in “SIP Macros and Statements” on page 24.
- Defining your entire database by coding RAMFIL statements, including new record types for capture and restore, multiple TPF images, SNA resource definition, tape support (optional), and TPF/APPC (optional). Code UFTFTI macros describing the FARF layout of the database.
- Defining global areas using new parameters on the SIP GLOBAL macro.
- Allocating any necessary data sets, defining the database, and generating a new FACE table using the offline FACE table generator program.
- Allocating working storage in terms of frames, common frames, ECBs, system workblocks (SWBs).
- Setting the central processing unit (CPU) loop and communication shutdown levels.
- Adjusting CPU loop shutdown levels for frames, ECBs, SWBs, and input/output blocks (IOBs).
- Allocating programs, transfer vectors, and pools in the system allocator (SALO) input deck IBMPAL.
- Running SIP Stage II.
- Formatting a new loader general file.
- Reformatting your online modules and input/output blocks (IOBs).
- Creating new pilot tapes for globals (if you have I-stream shared globals).
- Running SALO to create the offline SAL table and the online program allocation table (PAT).
- Reassembling the linkage editor (LEDT) and any other programs that use the LOCORE macro (if you modify LOCORE).
- Reassembling general file keypoints against the TPF 4.1 BEGIN macro and run the linkage editor (LEDT).
- Including the ELDR CLEAR card in the general file loader (ALDR) or the auxiliary loader (TLDR) load deck.
- Allocating globals.
- Setting bit strings for system generation option bytes.
- Reformatting online modules.
- Modifying pilot tapes for globals.
- Locking programs into main storage.
- Excluding the list of literals (LTORGs) to save space.
- Loading E-type programs.
- Defining Systems Network Architecture (SNA) resources and the offline SNA table.
- Consolidating TPF Advanced Program-to-Program Communication (TPF/APPC) application program names.

- Defining the control program.
- Linkage editing.
- Modifying low core.
- Patching.
- Receiving messages from the online general file loader (ACPL).

Each of these changes are described in the sections that follow in this chapter.

File Address Compute Program (FACE) Table Generation and System Initialization Program

Before this release, the file address compute program (FACE) table (FCTB) was generated as part of the system initialization program (SIP). RAMFIL macros were coded in SIP Stage I to specify the characteristics of different record types, and the FACEA and FACEC macros were processed during SIP Stage II to define FACE table items and build the table.

In the TPF 4.1 system, FACE table generation is handled separately from SIP Stage I by a new offline FACE table generator program called FCTBG.

While SIP uses macros for input, FCTBG uses statements. The CONFIG, ONLFIL, SSDEF, and RAM macros in the TPF 3.1 system are now both macros (when they provide input to SIP Stage I) and statements (when they provide input to FCTBG). Because RAMFIL is processed by FCTBG, it is considered a statement instead of a macro. A new statement called UFTFTI is used to specify universal format type (UFT) values and corresponding format type indicator (FTI) sizes.

Once you have run FCTBG, you can run SIP Stage I or complete the process manually. See “Generating the File Address Compute Program (FACE) Table” on page 208 for more information.

See *TPF System Generation* for more information about the FACE table generator program (FCTBG) and system initialization.

System Installation Program (SIP) Changes

A summary of all new, changed, or obsolete system installation program (SIP) macros is contained in “SIP Macros and Statements” on page 24. New and obsolete parameters are listed in Table 3 on page 25.

In the TPF 4.1 system, there is a distinction between the term macro and statement, depending on whether the information is interpreted by the assembler, the file address compute program (FACE) table generator (FCTBG), or both. For example, in the TPF 4.1 system, the ONLFIL macro is interpreted as both a macro and a statement. The RAMFIL and UFTFTI statements are interpreted only by the FCTBG offline program.

Defining the Database

The TPF 4.1 system makes substantial changes to addressing records in the database with the advent of File Address Reference Format 4 (FARF4) and File Address Reference Format 5 (FARF5). If you are not migrating immediately to FARF4 or FARF5 addressing, you still must regenerate the FACE table. The database is defined by coding RAMFIL statements for all the records in it, including the restart area and keypoints, and creating a FACE table using these statements.

If you anticipate migrating to FARF4 or FARF5 addressing, the UFTFTI macro must be coded. The UFTFTI macro defines areas of the database in terms of FARF4 or FARF5 addresses. See “Expanded File Addressing Capacity and File Address Reference Format” on page 241 for more information about FARF4 and FARF5. Also see the *TPF Database Reference* for more information about database organization and FARF.

Parameters on the UFTFTI Statement

There are four parameters on the UFTFTI statement.

MODE

Specifies the default address dispense mode (FARF3, FARF4, or FARF5).

STAGE

Defines the migration stage (file address reference format 3 (FARF3) and FARF4, or FARF4 and FARF5).

UFACDATA

Defines the external name of a user data area that is attached to the FACE table (FCTB) at the FCTB level.

UFTI

Defines valid universal file types (UFT) and associated format type lengths for the FARF4 and FARF5 definitions of the database.

Universal File Types (UFT) and Format Type Lengths

The universal file types and format type lengths consist of 64 universal format types (6-bit UFTs) and format indicators (FTIs) up to 25-bits long. Taken together, a given UFT and FTI specify a particular record type. Adding an ordinal number to a UFT/FTI combination specifies an individual record within the record type. At least one bit is used for record type ordinal, so there are at least two ordinals in a record type. Likewise, at least one bit is required for FTIs, so there are at least two record types for any UFT.

All UFTs are essentially equivalent. There are no performance characteristics associated with them. Record type management schemes can help coordinate the uses of various kinds of records. Such schemes are based partly on the number of record types and ordinals required. When only a few record types are required, a smaller FTI can be chosen, one with fewer bits. When a large number of record types is required, a larger FTI provides a larger number of record types. For example, one UFT may specify FTIs being expressed with 3 bits while another UFT may specify FTIs being expressed with 21 bits.

The newer dispensing modes (FARF4 or FARF5) have an effect on the UFT/FTI combinations defined for record types, because FARF4 reserves 2 bits for migration and identification that are used by FARF5 for ordinal numbers. When a FARF4 record type is migrated to FARF5, the number of addressable ordinals is increased four times.

One possible record management scheme is to put the FARF4 record types in the lower half of the UFTs (up to UFT 31) and the FARF5 record types in the upper half of the UFTs (from UFT 32 to UFT 64). Another scheme is to put the FARF4 record types in the even-numbered UFTs and the FARF5 record types in the odd-numbered UFTs.

When records are specified in a RAMFIL statement, the dispensing mode (FARF4 or FARF5) to use for them is also defined. When a record is dispensed to an online program, the existing dispensing mode is interrogated as well as the defined

dispensing modes for the record. This selects a certain UFT/FTI pair. The UFT/FTI information is used in the FACE table to retain the actual record address dispensed for future use. Among other things, the FACE table contains information showing how to interpret a specific address.

Defining UFT/FTI pairs for a database is a critical activity. Much thought must be given to their coding because the future usability of the database depends on how these pairs are defined.

See “Migrating File Addresses” on page 242 for more information about the UFT.

Defining Record Types for Capture and Restore

In order to use Capture and Restore in the TPF 4.1 system, you must do the following:

- Regenerate the Capture and Restore BXAX Keypoint according to SKBXAXF
- Define ordinals 27 through 43 of record type #IBMM4 on the RAMFIL statements
- Reassemble all Capture and Restore segments that refer to the BXAX Keypoint.

See the *TPF Database Reference* for more information about Capture and Restore.

Defining Record Types for Multiple TPF Images

The following new record types are required for multiple TPF images.

Record Type	Description
-------------	-------------

#IPL1	Initial program load (IPL) area for the primary image
#PROG1	E-type program base for the primary image
#CIMR1	Core image restart area for the primary image
#CTKX	Image-unique image pointer records
#KSA1	Keypoint staging area for the primary image
#KBA	Keypoint backup area for the primary image.

The Image History Record (IHR) in record type #IBMM4 is also required. This record type contains image information for each of the IPL areas and the CIMR components.

These record types are required for the primary image, regardless of whether you use multiple TPF images. If you plan to define more than one image, you must ensure that program records are not used as shared read/write data records.

In the TPF 3.1 system, SIP generated #RSTR1 record types for the restart area. In the TPF 4.1 system, you must define #CIMRx record types for each image.

Defining Record Types for the E-Type Loader

E-type loader fixed file (#OLDx) records are required for the E-type loader. This record type contains all the fixed file records necessary for the E-type loader. It contains an ordinal number for each of the structures (LSD, ERD, ERT, and so on). In addition, the #OLDx record type contains a pool of ordinals that are used to store the programs that are loaded through the E-type loader and build additional E-type structures, such as EPDs. The number of ordinals defined for this record type determines how many programs can be loaded through the E-type loader.

The #OLDx record type is not required for the TPF 4.1 system, but if it is not defined, the E-type loader cannot be used.

Note: The #OLDx record type is program base unique.

Allocating the #OLDx Records

In general, you need to allocate enough #OLDx records to satisfy the following equation:

$$\begin{aligned} \text{Total number of records required} &= (\text{maximum number of loadsets} \\ &\text{online in the subsystem} * \text{average number of programs in each loadset}) \\ &* 1.1 \end{aligned}$$

Figure 1. Allocating #OLDx Records

The 1.1 factor will take into account EPDs, LSDs, and records that are required and reserved for the E-type loader.

If you want to determine the minimum number of records necessary for the #OLDx record type, you need to consider the # value of MAX_NUM_ACTIVE_LOADSETS. Because of the design of the WRT and the ELT, you are advised to allocate enough records in the #OLDx record type so as to have at least 200 available fixed file records for each processor generated in the complex. Use the following calculation to do so:

$$\begin{aligned} \text{Minimum number of #OLDx records required} &= 35 \\ &(\text{reserved}) + (32 * \text{MAX_NUM_ACTIVE_LOADSETS} / \text{NUMBER ENTRIES PER ECR}) \\ &(\text{****}) \quad (\text{IBM default} = 1000) \quad (\text{See c$idsecl.h}) + (\# \text{ CPUs genmed} * 200) \\ &(\text{recommended number of available records}) \end{aligned}$$

Figure 2. Calculation for Allocating #OLDx Records

In the previous calculation, **** is the maximum number of processors supported by the E-type loader. This value must always be 32.

The following is the RIAT definition for the #OLDx record types:

```
RIATA ID=00E0, /* record ID */ LOG=NO, /* #OLDx
is not to be logged */ XCP=NO, /* #OLDx is not to be exception
recorded */ UEXIT=NO, /* A user exit will not be defined for special
*/ /* processing */ VFAF=NO, /* #OLDx is
not a VFA candidate */ LOCKF=DASD, /* the lock is maintained by the
DASD ELLF control unit */ RCSF=RET, /* retentive access -
#OLDx records are placed on */ /* the DASD surface &
cache when a file-type */ /* macro is issued. */
RESTORE=NO, /* #OLDx is not to be restored */
```

Figure 3. RIAT Definition for #OLDx Record Types

Defining Record Types for Program Version Information

Program version (#PVRx) records are used by the E-type loader (OLDR), auxiliary loader (TLDR), and general file loader (ALDR). These records contain program information such as the version code and assembly date. There is an entry in the #PVRx record type for each allocated program. Therefore, the number of ordinal numbers that need to be defined can be determined based on the:

- Number of programs allocated

- Size of each program's entry in the version code record.

The #PVRx record type is not required. If you do not define any version code records there will be no support for version codes or assembly date.

Note: Like the #OLDx and #PROGx record types, the #PVRx record type is also program-base unique.

The following is the RIAT definition for the #PVRx record types:

```

RIATA ID=FF0E,      /* record ID */      LOG=NO,      /* #PVRx
is not to be logged */      XCP=NO,      /* #PVRx is not to be exception
recorded */      UEXIT=NO,      /* A user exit will not be defined for special
*/      /* processing */      VFAF=NO,      /* #PVRx is
not a VFA candidate */      LOCKF=DASD, /* if the lock is maintained by
the DASD ELLF control unit */      RCSF=RET, /* retentive access -
#PVRx records are placed on */      /* the DASD surface &
cache when a file-type */      /* macro is issued. */
      RESTORE=NO /* #PVRx is not to be restored */

```

Figure 4. RIAT Definition for #PVRx Record Types

Defining the New Record ID for the TPF Application Requester (TPFAR) Feature

Define the new record ID X'FF0F' to the system using the RIATA macro. The record IDs go into RIAT. The parameters you need to code are:

```

RIATA ID=X'FF0F'
RTP0=(4,ST,R)
VFAP=DELAY

```

Note: Although the VFAP parameter has three options, it is recommended that you code VFAP=DELAY for performance reasons.

Generating the File Address Compute Program (FACE) Table

The file address compute program (FACE) table was changed to support the increased addressing capacity provided by the File Address Reference Format 5 (FARF5). Beginning with this release, the FACE table is generated by the FCTBG offline program.

The FCTBG offline program uses the ONLFIL, SSDEF, CONFIG, RAM, RAMFIL, and UFTFTI statements from the SIP Stage I deck as input. FCTBG generates the FACE table, the DASD format deck, CYMZ and OPMxxx tables in SYCON, most of SYSEQC and STCEQ, FMTRx, and a macro called SYFCTB, which is needed by SIP Stage 1 for validation.

The FCTBG offline program produces the FACE table in the form of an IBM Multiple Virtual Storage (MVS) object module. Use the IBM MVS linkage editor to convert this object module to an IBM MVS load module, which can then be loaded by the TPF 4.1 system. Use the IBM MVS linkage editor (LEDIT) to attach CONK, CTSD, and user data to the FACE table.

You must build a new FACE table for the TPF 4.1 system. See *TPF System Generation* for a summary of the record types that are checked by the FACE table generator program (FCTBG).

To Build a New FACE Table

1. Code RAMFIL statements for all new and changed record types.
2. Code a UFTFTI statement and UFTIx parameters on RAMFIL statements (optional).
3. Run the FCTBG offline program.
4. Complete the process by doing a full SIP (Stage 1 and II). Assemblies of parts of SIP may be attempted, however, this is not recommended. See *TPF System Generation* for more information about rebuilding the FACE table.
5. Load the FCTB module.

Allocating Globals

In the TPF 4.1 system, I-stream shared globals and one copy of I-stream unique globals are under 16 MB. See Figure 5 on page 210 for more information. Real storage in high memory is reserved for copies of the application program I-stream unique globals. The main I-stream's view of storage (VM) is essentially identical to real memory. Global directories for both I-stream unique and I-stream shared globals reside in the I-stream unique global areas.

Each application program I-stream sees its own I-stream unique globals under 16 MB, even though these globals actually reside in high real memory. For this reason, application programs dispatched on any I-stream can access all the shared and unique globals they need using 24-bit addresses.

The size of the different global areas is specified during the system initialization program (SIP) on the GLOBAL macro.

There are four new parameters.

SSUSHRx

Specifies the number of 4 KB blocks required to contain the I-stream shared primary globals. This parameter is optional and may be coded with a value of 0.

SSUIUNQx

Specifies the number of 4 KB blocks required to contain the I-stream unique primary globals.

SSUXSHRx

Specifies the number of 4 KB blocks required to contain the I-stream shared extended globals.

SSUXUNQx

Specifies the number of 4 KB blocks required to contain the I-stream unique extended globals.

The global areas and the parameters that correspond to them are shown in Figure 5 on page 210. Although the layout for extended globals in the TPF 4.1 system is the same as it was in the TPF 3.1 system, you must completely regenerate globals for the new layout of the primary global areas.

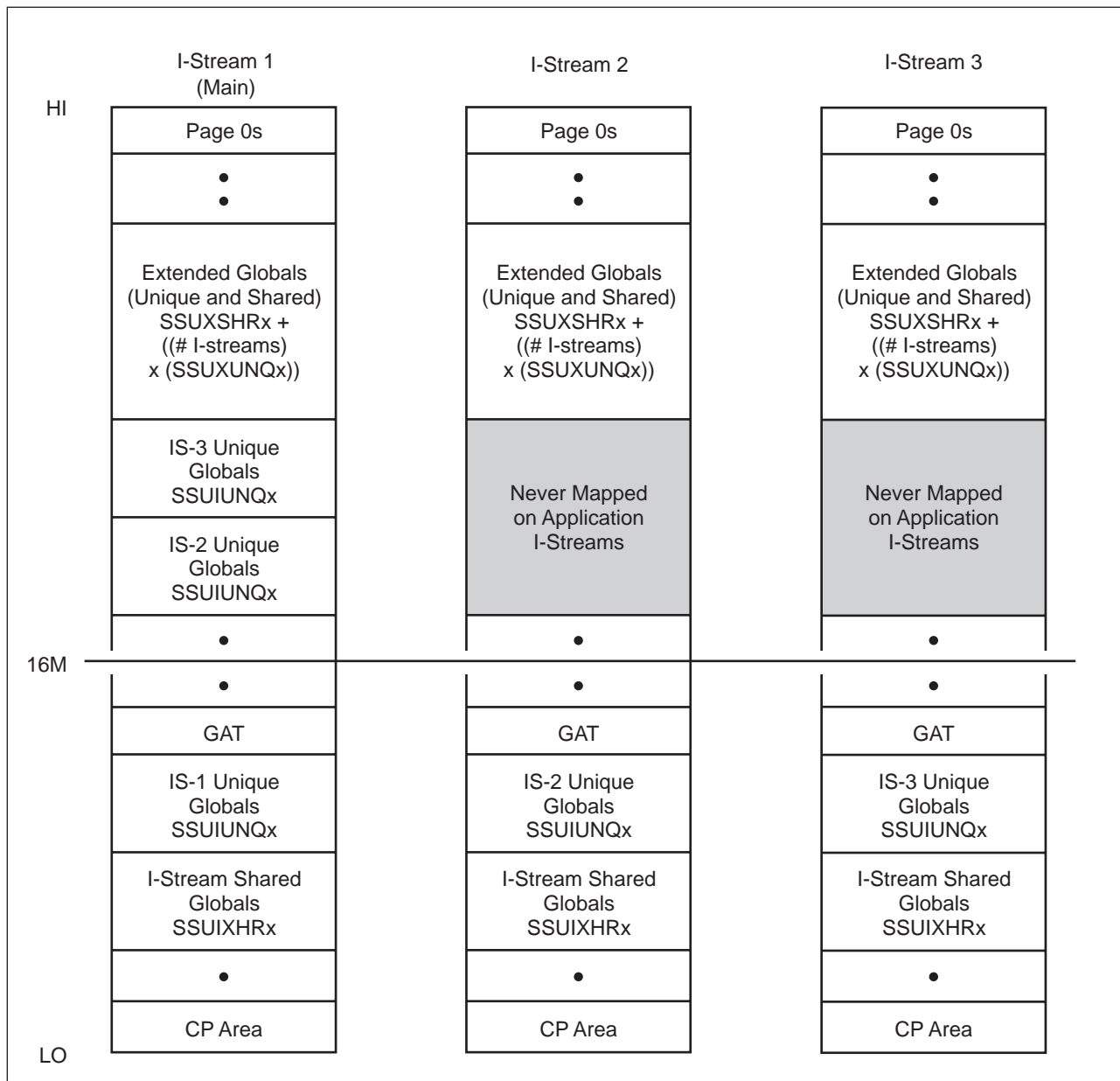


Figure 5. Location of Global Areas in a Multiprocessing Environment with Three I-Streams. This figure shows the use of SIP GLOBAL macro parameters.

ACF/SNA Table Generation Support

In the TPF 3.1 system, to install new network definitions, you had to bring down the network, cycle down all the processors in a loosely coupled complex, and load the pilot tape. Offline ACF/SNA table generation (OSTG) could only write network definitions to tape in a pilot tape format. After loading the pilot tape, all processors had to be IPLed and then cycled back up to NORM state. The resource resolution table (RRT) contained only one set of network definitions.

In the TPF 4.1 system, OSTG allows you to write network definitions to tape or general data sets (GDSs). The new dynamic load function allows you to load SNA resource definitions without deactivating the network and cycling all processors to

1052 state. If you find problems with the new network definitions, you can fall back to previous definitions, regardless of how many CPUs have incorporated the new definitions. You can perform all of these tasks by using the new ZNOPL command.

When you enter the ZNOPL LOAD command, the TPF 4.1 system takes the network definitions from the tape or GDS and loads them into the resource resolution table (RRT). RRT entries are processor shared; there is only one set of RRT entries for all processors in a complex. You can enter the ZNOPL command from any processor in a loosely coupled complex, in any system state, to perform either fresh or dynamic loads.

In the TPF 4.1 system, the RRT contains up to two sets of network definitions and is divided into two tables:

- The existing RRT
- The new RRT.

The existing RRT contains the current SNA resource definitions, while the new RRT contains the new ones.

In a fresh load, the existing RRT is initialized with the contents of the SNA tape or GDS. A fresh load causes SNA restart to create and initialize all of the TPF SNA control blocks, such as resource vector tables (RVTs), node control blocks (NCBs), and the subarea address table (SAT), during a soft IPL.

In a dynamic load, the new RRT is created for the new resources. A dynamic load allows you to enter new network definitions into the TPF 4.1 system without bringing down your network, communication controllers, or network control programs (NCPs). A dynamic load creates and initializes only the SNA control blocks for the new resources. It does not change the control blocks for the resources that existed before you performed the dynamic load. You can perform a dynamic load in any TPF system state while the network is active. To perform a dynamic load, enter the ZNOPL LOAD command with the DYNAMIC parameter specified.

For loading SNA definitions, the ZNOPL LOAD command replaces the ZSLDR LOAD DATA command. (The ZSLDR LOAD DATA command is still used for loading other pilot tapes.)

See the *TPF ACF/SNA Data Communications Reference* for more information about the dynamic load function. See *TPF Operations* for more information about the ZNOPL commands.

See “Defining Systems Network Architecture (SNA) Resources” on page 252 for information about how to define SNA resources using fresh and dynamic loads.

Setting Bit Strings for System Generation Option Bytes

The new SYSUG macro allows you to set bit strings (SYSTC bits) for system generation option bytes 0 through 7. This is optional. The SYSUG macro is called exclusively by the SYSTC macro, just as the SYSTG macro is called for the IBM system generation option bytes.

If you code the SYSUG macro, do so before SIP Stage II. If your system is already built, and you want to add or delete one of these bits, you will need to reassemble and link edit the control program.

You can modify existing SYSUG bits by using the new ZSYSG command. See “Modifying System Generation Option Values” on page 262 for more information about the ZSYSG command.

Formatting the General File Loader (ALDR)

Because of differences in the DASD format of the general file loader (ALDR), the same ALDR used in previous releases cannot be used. A DASD should be formatted with the SIP-produced format JCL.

You must reformat the ALDR to maintain a 4 KB program record area and to ensure that the keypoint area now precedes the program area. You do not need to put all of the required core resident programs at the front of the allocator decks because residency is specified on the allocator statement itself, rather than being determined by the position of the allocator statement. All programs, both file and core resident, reside in one area.

Reformatting Online Modules

Because all E-type programs are 4 KB in size and will be 4 KB on DASD, you may need to reformat your online modules as well as your general files.

The TPF DASD formatter now supports 4-digit DASD numbers. In the TPF 3.1 system, the volume serial number (VSN) naming scheme was LXXXZZZZ where:

L Was the device type letter

XXX

Was the 3-digit DASD number

ZZZZ

Was the subsystem name.

In the TPF 4.1 system, the naming scheme is LXXXX.ZZZZ.

Working Storage and 16-MB Constraint Relief

Before this release, working storage had to be under 16 MB, restricting the number of tasks that could be run at a time. Also, some system tables, including large system tables such as the Systems Network Architecture (SNA) tables, the file address compute program (FACE) table, and the system interprocessor global table (SIGT), resided under 16 MB, along with the application program global areas for all I-streams. The location of these tables under 16 MB further limited the space available to you.

When ECB-controlled (E-type) programs wanted to get working storage, they had to do so in one of four fixed block sizes. C language programs did the same thing, using C functions that corresponded to pre-existing assembler macros. Contiguous memory was limited to 4095 bytes.

Beginning with this release, up to 2GB of total main storage are supported. With the use of the dynamic address translation (DAT) facility, TPF programs can view and manipulate the working storage located above 16 MB as if it was under 16 MB, therefore preserving the existing 24-bit addressing application program interface (API).

In the TPF 4.1 system, the concept of real (main) storage was expanded with the concept of virtual storage. The layout of virtual storage in the TPF 4.1 system is shown in Figure 6 on page 215.

Transaction Protection and Data Integrity

The TPF 4.1 system separates and isolates information into types of address spaces. The two major address spaces are for the following:

- System processing
- Message processing.

In the TPF 4.1 system, each message has its own address space.

Through the use of the dynamic address translation (DAT) facility and low address protection, the TPF 4.1 system changes how storage is physically and logically used for system programs, application programs, and messages.

The DAT facility provides a virtual storage environment for the running program and detects whether the program is storing into address space other than its own. Each message has private storage both above and below 16 MB that is not accessible by other transactions. However, message information that needs to be shared can be shared by other messages through common storage below 16 MB. The TPF 4.1 system uses the DAT facility to provide each message with private areas that cannot be damaged by other messages or by the TPF 4.1 system when it operates on behalf of other messages.

This program isolation prevents some of the storage-sharing techniques used in previous releases. However, messages can still share common information in storage through a pool of working storage below 16 MB called the *common area*.

The low address protection facility protects the first 512 bytes of storage against any alteration by an application program or the TPF 4.1 system regardless of the storage key used.

Increased Main Storage for Application Use

By using the TPF 4.1 system, your application programs benefit from increased access to storage above and below 16 MB while maintaining the 24-bit application program interface (API) for existing TPF system programs. The concept of virtual storage replaces the concept of real (main) storage.

The TPF 4.1 system supports up to 2 GB of main storage. With the use of the dynamic address translation (DAT) facility, TPF system programs can view and manipulate storage located above 16 MB as if the storage was below 16 MB, removing the 16-MB constraint and allowing program access of up to 2 GB of main storage. Each message can use up to 2 MB of memory for its private use and then reference any other data that is available in main storage.

In the TPF 4.1 system, the use of storage is streamlined and more storage is available below 16 MB for application programs. Application programs that are written using 31-bit addressing can use a separate, exclusive 31-bit program area above 16 MB. All large TPF system tables are supported above 16 MB.

Allocating Working Storage

With the availability of storage above 16 MB, more working storage can be allocated than in previous releases. In addition, the TPF 4.1 system requires more storage.

Working storage allocation is now composed of:

- Frames
- Common frames
- Entry control blocks (ECBs)
- System work blocks (SWBs)
- Input/output blocks (IOBs).

In general, you should allocate the same number of ECBs as for the TPF 3.1 system. A rule of thumb for allocating frames is to allocate 10 frames for an ECB (but this will not work for all systems). You can use TPF data collection reports to calculate the number of frames you should allocate.

The number of IOBs required in the TPF 4.1 system is slightly less than was required in the TPF 3.1 system. This is because only DASD support code uses IOBs. All other functions that previously used IOBs (including tape support) now use SWBs. The relative numbers of IOB and SWBs should be changed accordingly.

You can use the ZCTKA command to change all working storage allocation values online if TPF data collection reports show that a problem exists with the original storage allocation values. See “Modifying Storage Allocation Values Online” on page 262 for more information about the ZCTKA command.

Virtual file access (VFA) is of more importance in the TPF 4.1 system than it was in the TPF 3.1 system. VFA size is determined by the number of bytes of storage left after all blocks are allocated. When allocating storage be careful that you allow sufficient storage for VFA. The TPF 4.1 system enforces a minimum VFA size of 512 KB at run time by applying percentage reductions to the working storage block allocations.

See the *TPF Database Reference* for more information about VFA.

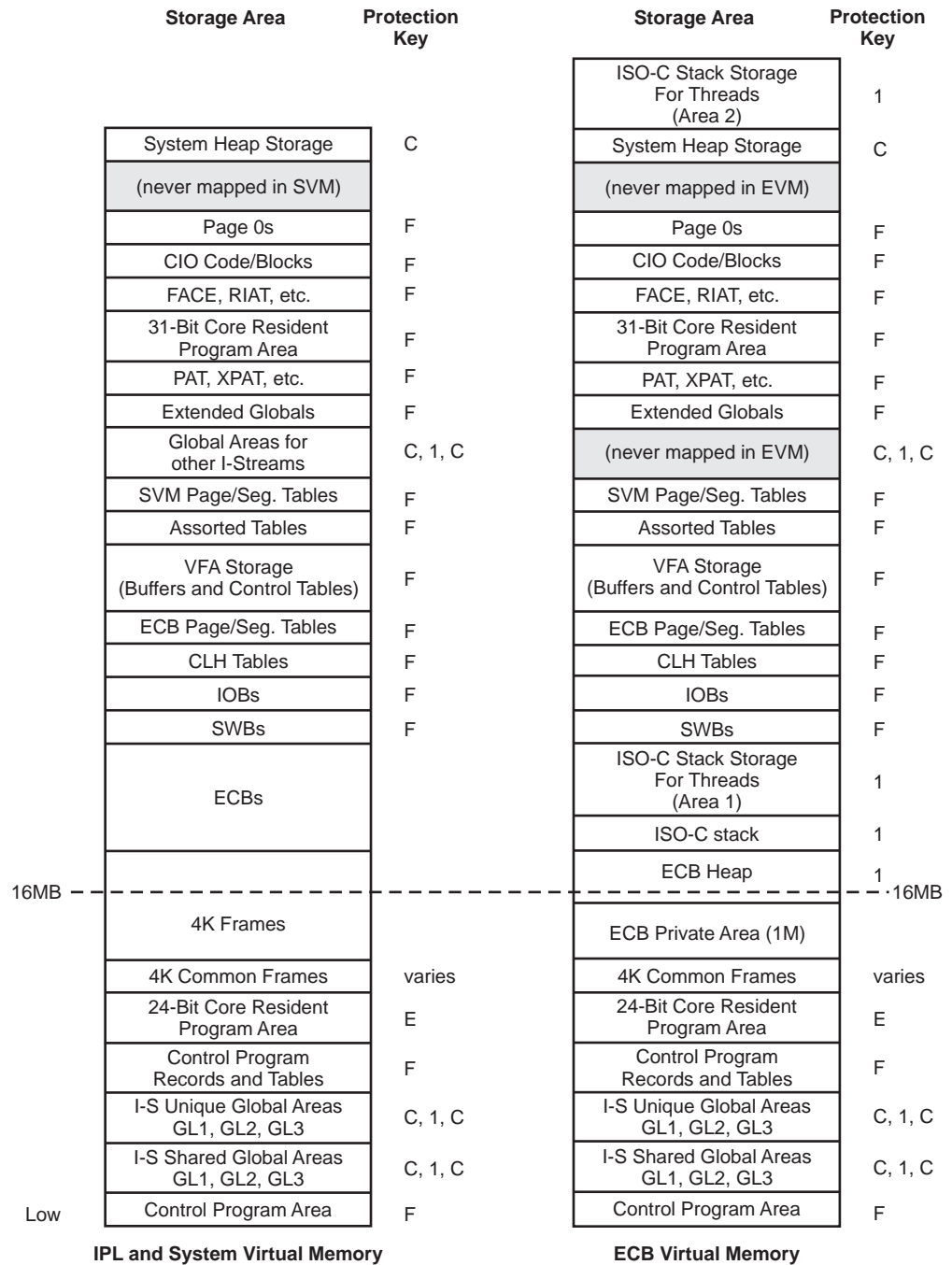


Figure 6. Virtual Storage Layout

Note: TPF's virtual address spaces makes it impossible to use a full 2 gigabytes of real memory.

Modifying Pilot Tapes for Globals

If you have I-stream shared global records, you must:

- Modify existing pilot tape decks
- Run the system test compiler (STC) against the new decks.

The TPF 4.1 global load function must be able to determine whether to load a given global record in the I-stream shared area or in the I-stream unique area. There is a new indicator in the GO1CON1 field in the GOA table entry that provides this information for each global record. When creating new pilot tapes for the TPF 4.1 system, you must turn on this indicator for I-stream shared records.

You must modify existing pilot tape decks and create new pilot tapes for use in the TPF 4.1 system.

Setting Central Processing Unit (CPU) Loop Shutdown Levels

In the TPF 3.1 system, shutdown processing was based on 381-, 1055-, and 4 KB blocks. In the TPF 4.1 system, CPU loop shutdown levels are set only for:

- Frames
- Entry control blocks (ECBs)
- System work blocks (SWBs)
- Input/output blocks (IOBs).

The values are specified as a percentage of the total number allocated after any system-induced storage reductions have occurred.

Shutdown values are initially set to system initialization program (SIP) values that are hardcoded based on a typical TPF 4.1 system. You can adjust these values by entering the ZACLV command, based on the performance of your system and your data reduction output.

Setting Communications Shutdown Levels

In the TPF 4.1 system, communication shutdown levels are based on the size of the input list. See “Setting Non-SNA Communication Shutdown Levels” on page 258 for more information.

Program Allocation Process

The program allocation process was changed substantially in the TPF 4.1 system:

- You can now allocate over one million (1 000 000) programs.
- The first time you bring up the TPF 4.1 system, you must perform a full load.
- Beginning with this release, most of the system generation information required to run a program is merged into the allocation process. The program allocation options are simplified:
 - All E-type programs are allocated as 4 KB.
 - All Enters and Backs to E-type programs are fast links, both for file-resident and core-resident programs. The concepts of corefast and coreslow are no longer supported.
 - Specifying virtual file access (VFA) candidacy options for program execution is part of the allocation process.
 - When you allocate programs, you allocate them as 24- or 31-bit programs. At run time, they will be invoked in the correct address mode. (All TPF 4.1 system program segments now operate in 31-bit mode. Application programs can be allocated in 24- or 31-bit mode unless they are written in IBM C language. All IBM C language programs require 31-bit mode.)
 - Specifying privileged macro authorizations is done at allocation time.

- Program allocation information is kept in a single table, called the program allocation table (PAT). The PAT is initially built by the system allocator and loaded to the online system. The PAT provides an enter-by-name capability that allows run-time determination of the address of the program being entered. Previous releases required that the name be available at assembly, compile, or link-edit time.
- The cross-subsystem services definition table (CGOT), previously needed for cross-subsystem enters, is no longer supported and must be removed from the load deck. With the enter-by-name support, no special program definitions are required for programs entered from other subsystems. Keypoint 3 (CTK3), previously needed to provide the TPF control program with ENTNC macro expansions, no longer serves this purpose. (In the TPF 4.1 system, a processor-unique CTK3 is available for your use.) With the enter-by-name support, ENTxC expansions can be resolved at run time.
- You can change all the characteristics of programs that are already allocated online by using the new ZAPAT command. You can use the E-type loader to allocate new programs in spare PAT slots, load unallocated programs, and change the allocation of programs. See “E-Type Loader” on page 225 for more information. Residency for a program is determined at run time.
- You can specify nesting limited to the ECB program nesting area (35 levels), or unlimited nesting, at system generation time. The nesting levels in the ECB are used for saving program linkage information.
- The SIP skeleton, SKPAL, and the PAL macro are no longer supported and were replaced by SALO input files. See “Allocating Programs, Transfer Vectors, and Pools” for more information about these files and allocating programs.

Allocating Programs, Transfer Vectors, and Pools

There are significant changes to the system allocator (SALO) process in the TPF 4.1 system:

- The offline SALO is written in IBM C language, and is compiled, link-edited and processed in one job.
- SKPAL and PAL are no longer supported. They are replaced by SALO input decks. SALO uses these decks to create the program allocation table (PAT) and the system allocator (SAL) table.

There can be up to 16 input decks. IBM provides one input deck, which is the IBMPAL input deck. You can concatenate up to 15 input decks of your own. Do not add allocator statements to the IBMPAL input deck because the order of the programs in the decks determines their ordinal number (also known as the program record number (PRN)) in the 4 KB fixed file record area. However, you may need to modify the allocator statements to meet your needs. All programs are allocated as 4 KB.

You do not need to put all of the required core resident programs at the front of the allocator decks because residency is specified on the allocator statement itself, rather than being determined by the position of the allocator statement.

You need to specify the names of the input decks and the data set that contains them on the new INDSN macro using these parameters.

SALDSN

The name of the input data set that contains all of your input decks (as members) for the system allocator.

SALMEM

A sublist of up to 15 deck (member) names. These decks, along with system required decks, are used as input to the system allocator.

Each SALO input deck consists of one or more statements in one of the formats described in the next section. You must code all statements, except comments, in uppercase.

Specifying the Addressing Mode

When you want a block of programs to run in a particular addressing mode (24-bit addressing mode or 31-bit addressing mode) without specifying this on each individual input statement, you can use the MODE statement. This statement provides a default mode setting for all subsequent program statements in the input decks.

The format of the MODE statement follows:

MODE=24BIT|31BIT

where **24BIT** is the default.

Notes:

1. All programs written in IBM C language must be allocated in 31-bit addressing mode. This allows them to call heap storage functions, which return 31-bit addresses.
2. The FACE, SIGT, RIAT, and SNA tables are now above 16 MB. All programs that manipulate these tables or reference the FC0TB, SI0GT, and DCTRIT data macros must be allocated as 31-bit addressing mode.

Allocating Programs

All program records are 4 KB. The order in which the programs appear in the input decks determines their program record numbers (PRNs). Every program allocation statement is allocated as a 4 KB block.

The format of the input statements for allocating file resident and main storage resident or core resident programs follows:

```
prog,FR|CR [,CLASS=SHARED|COMMON|UNPROT|ISUNIQ|PRIVATE] [,MODE=24BIT|31BIT]
      [,OPTIONS=(KEY0,MONTC,RESTRICT,CMB,xxx)][,SS=ALL|EXC|ssname]
      [, FUNC=1|0|fsname]
      [, PRELOAD ]
```

Where:

prog

The 4-character program name that is being allocated. The program name must be four characters long and the first character must be alphabetic.

FR|CR

Indicates whether the program is to be file resident (FR), main storage resident, or core resident (CR). FR replaces the MR used in previous releases.

CLASS=

Defines the residency characteristics of the program. Programs can reside in

protected or unprotected storage, be I-stream shared, I-stream unique, or ECB-unique. Table 41 summarizes the attributes associated with the different classes.

Note: The distinction between shared and I-stream shared. The SHARED class refers to ECBs sharing the same copy of a program, which is the default. COMMON refers to ECBs sharing a copy of the program and seeing it at a common address.

Self-modifying programs must be allocated as unprotected, which causes the demand counter to remain as part of the 8-byte program header. The demand counter for protected programs is in the program allocation table (PAT).

Note: Core resident programs must have CLASS values of SHARED or COMMON.

SHARED

Indicates that all ECBs use the same copy of the program, but only those ECBs currently using the program can view it. In addition, all ECBs using the program can potentially access the program at different ECB virtual addresses. The program resides in page-protected memory and key-protected memory. The demand counter for shared programs is located in the PAT entry of the program.

The default is **SHARED**.

COMMON

Indicates that all ECBs use the same copy of the program and access the program at the same address. The program resides in key-protected storage. The demand counter for a common program is located in the PAT entry of the program.

UNPROT

Indicates that this is a self-modifying I-stream shared program. All ECBs use the same copy of the program and access the program at the same address. The program resides in unprotected storage. The demand counter for an unprotected program is in the 8-byte program header.

ISUNIQ

Indicates that this is a self-modifying I-stream unique program. All ECBs on the same I-stream use the same copy of the program and access the program at the same address. All copies of the program reside in unprotected storage. The demand counter for an I-stream unique program is in the 8-byte program header.

PRIVATE

Indicates that this is a private program to be loaded to a unique unprotected working storage block each time it is entered. Private programs do not have a demand counter.

The default is **SHARED**.

Table 41 summarizes the use of the CLASS values for file resident programs.

Table 41. Summary of CLASS Values for File Resident Programs

	I-Stream Shared	I-Stream Unique	ECB Unique	Same Address	Protected	Un-Protected
SHARED	X				X	
COMMON	X			X	X	

Table 41. Summary of CLASS Values for File Resident Programs (continued)

	I-Stream Shared	I-Stream Unique	ECB Unique	Same Address	Protected	Un-Protected
UNPROT	X			X		X
ISUNIQ		X		X		X
PRIVATE			X			X

MODE=24BIT|31BIT

The addressing mode in which the program is entered. This parameter overrides any preceding MODE statement for this program. All programs written in IBM C language must be allocated in 31-bit mode.

OPTIONS=

One or more of the following macro authorization options (separated by commas).

KEY0

Authorization specifies that the E-type program is allowed to issue a CINFC W, which allows the program to store into protected storage.

MONTC

Specifies that the E-type program is allowed to issue a MONTC macro, which allows the program to store into protected storage as well as process privileged instructions until the program issues a LMONTC macro.

RESTRICT

Specifies that the program is allowed to issue macros that are restricted for other reasons.

CMB

Specifies that the program can issue the GETCC macro to get common blocks.

xxx

Specifies a user-defined authorization. You can define up to eight of these. See “Adding Your Own Authorization Bits” on page 223 for more information.

See “Issuing Macros that Require Authorization” on page 310 for a list of macros that require one or more of these authorizations by the calling E-type program.

SS=

A valid subsystem name as declared in the SIP Stage I SSDEF macro.

ALL

Indicates that the program should be allocated in all subsystems.

EXC

Indicates that the program should be allocated in all subsystems except the BSS.

ssname

A valid subsystem name as declared in the SIP Stage I SSDEF macro.

The default is **ALL**.

FUNC=

A function switch.

- 1 Specifies that the program allocated by this statement is placed in both the system allocator (SAL) table and the program allocation table (PAT).
- 0 Specifies that this program is a dummy and is put only in the system allocator (SAL) table.

fsname

A valid switch name taken from the SIP-created IBM C language header file `c$idfunc.h`. See "Adding Your Own Function Switches" on page 223 for more information.

The default is 1.

PRELOAD

Guarantees a core resident program will be resident in the CRPA before it is called for the first time. These programs are loaded synchronously at the beginning of restart.

All other core resident programs will be loaded by one of two methods:

- They will be loaded asynchronously, during restart, while the TPF 4.1 system is cycling up to 1052 state.
- The restart load process will be bypassed and the programs will be loaded on demand the first time they are called.

The preferred method can be specified during SIP Stage 1 or by entering the ZSYSG ALTER command.

Be sure to define the core resident program area (CRPA) large enough to hold all the core resident programs. Failure to do so may cause the TPF 4.1 system to go into input list shutdown due to a depletion of blocks.

Allocating Transfer Vectors

A *transfer vector* is the label name given to an entry point into a program. The program in which the entry point is located is called the parent. The parent can have multiple entry points (transfer vectors) within it. An allocation statement in a parent program must precede all its transfer vector's allocation statements. A transfer vector has the same allocation attributes as its parent. Each transfer vector uses 4 KB of DASD.

The format of the input statements for allocating transfer vectors follows:

prog,**TV**,*parent*,*tv*#

Where:

prog

The 4-character transfer vector name that is being allocated. The first character must be alphabetic.

TV

Indicates that this is a transfer vector statement.

parent

The 4-character program name this transfer vector is located in. The parent cannot be a transfer vector.

tv#

The transfer vector number for *prog*, which must be a decimal number in the range 0 to 1023.

Allocating Spare Program Slots

Spare statements interspersed throughout the program allocation table (PAT) hold resources so that programs can be placed in these positions at a later time. This allows you to add and delete programs without requiring a full load. Any programs you add without using spares must be added after the last entry in the last input deck. If programs are added in the middle, a full load must be done.

The format of the input statements for allocating spare program slots follows:

SPARE

Where:

SPARE

Indicates that this is a spare statement.

Defining Pools

The format of the input statements for defining pools follows:

<i>poolsym</i> , TYPE=POOL,VALUE=svc

Where:

poolsym

The 3-character GFS ID to be expanded. The first two characters are the record ID and the third character is the record size attribute (L for large records or S for small records).

svc

A 3-byte hexadecimal SVC interrupt code. Valid codes include:

0ABC <i>nn</i>	SLT (small, long-term)
0ABE <i>nn</i>	SST (small, short-term)
0AC0 <i>nn</i>	SDP (small, duplicated)
0AC2 <i>nn</i>	LLT (large, long-term)
0AC4 <i>nn</i>	LST (large, short-term)
0AC6 <i>nn</i>	LDP (large, duplicated)

Where *nn* is:

00	ratio dispensing option
04	DASD Device A
08	DASD Device B
0C	DASD Device C
10	DASD Device D

Adding Your Own Authorization Bits

In the TPF 4.1 system, you can authorize programs for certain privileges, such as issuing:

- CINFC W (key 0 authorization)
- MONTC to store into protected storage
- GETCC to get common blocks.

You may want to grant (or deny) other privileges to programs, and you can do this by defining up to eight of your own user authorization bits.

The bits are defined in the `c$idsalo.h` IBM C language header file. To add your own bits, edit this file and add your own authorization names and their corresponding bit values.

Adding Your Own Function Switches

Function switches determine whether a program is allocated normally or as a dummy program.

To Add Your Own Function Switches

1. Update the SIP SKFUNC skeleton. Add your new switch in four places:
 - a. In the list of switches in the prolog section (comments) of the macro, along with a description of the switch.
 - b. In the section where global variables are defined, for example:

```
GBLB &NEWFUNC
```
 - c. In the section containing SETB instructions, for example:

```
&NEWFUNC    SETB    (&SBaaaa AND &SBbbbb)
```

(where `&SBaaaa` and `&SBbbbb` are defined function switches).
 - d. In the final section that punches out the IBM C language header file, before the EOFL statement, for example:

```
PUNCH '          "NEWFUNC",&NEWFUNC,'
```
2. Code your new function switch name on the FUNC parameter of the program allocation statement.
3. Code `EXPRS=S` on the SIP GENSIP macro to generate the `c$idfunc.h` IBM C language header file.
4. Rerun SIP Stage I.
5. Run the JCL generated by step 4.

When adding a new function switch, avoid using names beginning with `&SB`. This naming convention is reserved for IBM use.

System Allocator (SALO) Program

Your system allocation process is simplified using the TPF 4.1 system. The system allocator (SALO) program compiles, link-edits, and runs in one job. Before this release, allocation was staged in several jobs.

You can change the characteristics of program allocations online. Beginning with this release, most of the system generation information required to run a program is merged in the allocation process. The program allocation options are simplified.

The system allocator (SALO) program is written in IBM C language and is compiled, link-edited, and run in one job in SIP Stage II. The new SALO takes input from one IBM source (IBMPAL) and up to 15 user-provided sources, which is specified on the new SIP INDSN macro. The output of SALO is two tables:

- The program allocation table (PAT)
- The system allocator (SAL) table.

Note: The allocation of the SAL table has changed for the TPF 4.1 system. See *TPF System Generation* for more information about the allocation of this table.

The PAT serves as the online system allocator and the program sharing table (PST), and contains the file and main storage addresses of all E-type programs. The SAL table is strictly an offline structure that is used by the TPF linkage editor (LEDT) to resolve external references within object modules.

Because the TPF 4.1 system allocator is written in IBM C language (along with other offline components such as the E-type loader and the FACE table generator), a C compiler is required for the TPF 4.1 system. See “Operating Environment Requirements and Planning Information” on page 185 for more information about the C compilers that are supported for the TPF 4.1 system.

Running the System Allocator (SALO)

Before you can run the system allocator (SALO), you must have:

- The IBMPAL input deck
- Any input decks that you want concatenated (and the names of these decks coded on the INDSN macro)
- Any of your own authorization bits in the `c$idsalo.h` IBM C language header file.
- Any of your own function switches in the SIP SKFUNC skeleton
- The C run-time library.

Note: In the TPF 4.1 system, the residency of some SNA segments has changed. As a result, you need to rerun SALO (IBMPAL).

There are two different ways you can run SALO, depending on whether you run SIP Stage I, or both SIP Stages I and II.

To Run Only SIP Stage I

1. Code `EXPRS=S` on the SIP GENSIP macro.
2. Assemble the Stage I deck.
3. Run the JCL that was produced from SIP Stage I.

To Run Both SIP Stages I and II

1. SALO is compiled automatically, link-edited, and processed during Stage II.

When SALO runs successfully, it produces the system allocator (SAL) table and the program allocation table (PAT), which are written to disk as partitioned data sets.

Locking Programs into Main Storage

To lock a core resident program into main storage, allocate the program as PRELOAD. The program is guaranteed to be locked into storage before 1052 state. The number of programs that are allocated as PRELOAD should be minimized for performance reasons.

Excluding a List of Literals (LTORGs) to Save Space

In the TPF 3.1 system, each program included a list of literals (LTORGs) at the end, whether the literal pool was needed or not. In the TPF 4.1 system, programs are packed into the core resident program area (CRPA), so program size becomes more important.

The LTORG instruction rounds up to the next doubleword boundary, even if there are no literals. If you have programs that do not have literals, and are between 4089- and 4095-bytes long, you can code FINIS LTORG=NO, and this rounding will not take place. This will allow your program to fit into a 4 KB block.

E-Type Loader

Changes to the E-type loader for the TPF 4.1 system are extensive and include the following:

- You must create new E-type loader tapes because tapes from previous releases are not compatible with the TPF 4.1 system.
- The E-type loader load decks used for the TPF 3.1 system are not compatible with the TPF 4.1 system.
- The E-type loader in the TPF 4.1 system requires the existence of the IBM C language run-time library.
- The E-type loader loads programs while the TPF 4.1 system is in production. In the TPF 3.1 system, you could load only 25 E-type programs at a time using a tape input device. However, in the TPF 4.1 system, you can load an unlimited number of E-type programs as well as IBM C language library functions and IBM TPF Database Facility (TPFDF) programs. You can load these programs and library functions using a tape input device, general data set (GDS), virtual reader, or user-defined input device.
- When you load programs and C library functions to the TPF 4.1 system, you group them into loadsets. A *loadset* is a group of programs that is identified by a unique name. The E-type loader can perform functions on all the programs in a loadset at the same time or on individual programs within a loadset. E-type loader enhancements allow easier grouping, allocation, loading, manipulation, and display of programs and loadsets. A rules database also allows you to tailor the way the E-type loader processes under certain circumstances.
- You can also use the E-type loader to allocate a new program in a spare slot in the program allocation table (PAT). You can do so online without performing an initial program load (IPL) of the TPF 4.1 system. You can also load a program that has not been allocated online or offline.
- The TPF 4.1 system solves the interface problem that occurred in the TPF 3.1 system. When programs were loaded to the TPF 3.1 system using the E-type loader, there was a short period of time when both old and new versions of a program were used. This no longer occurs in the TPF 4.1 system.
- In the TPF 3.1 system, the E-type loader load function replaced the programs at the allocated addresses with the newly loaded programs. In the TPF 4.1 system, the E-type loader load function is divided into three separate functions:

- Load
- Activate
- Accept.

When you load programs to the TPF 4.1 system, you must activate them before you can use them. The programs at the allocated addresses are not replaced until you accept the newly activated programs. This allows you to test different versions of programs before accepting them to the TPF 4.1 system. See “Loading E-Type Programs” on page 268 for more information about these and other E-type loader functions.

- You can allocate and load new programs even if they were not allocated in the offline allocator because of the following changes:
 - All unresolved enter requests to new programs use a hash table to locate the online program allocation table (PAT) slot
 - New programs are added to an extra slot in the PAT and the hash table is updated.
- If you run the offline allocator, a new PAT is included on an E-type loader device and is compared to the existing online PAT to see whether the 2 versions are compatible. If no shifts in the program sequence occurred and the PATs are compatible, the E-type program load is allowed. This compatibility checking prevents you from using the wrong offline allocator.
- The E-type loader puts loaded programs into #OLDx fixed file records, which are eventually returned to the TPF 4.1 system when a delete or an accept function is performed on the loadset.

This has the following serious implications:

- You need to allocate #OLDx fixed file records to use the E-type loader in the TPF 4.1 system. In addition to the programs, there are other file-resident structures that have overflow records stored in fixed file records including the E-type loader loadset directory (LSD). Also, there is at least one E-type program directory (EPD) for each loadset found in the TPF 4.1 system.
- The file address of a program record should not be saved by an application program because it may be a temporary address. Application programs should use the GETPC macro to get the file address of a program record.

See “Defining Record Types for the E-Type Loader” on page 206 for more information about #OLDx fixed file records.

Systems Network Architecture (SNA) Communication

See “Defining Systems Network Architecture (SNA) Resources” on page 252 for information about defining Systems Network Architecture (SNA) resources, “Generating the Systems Network Architecture (SNA) Table” on page 252 for information about the offline ACF/SNA table generation (OSTG), and “Consolidating TPF/APPC Application Program Names Across CTC” on page 253 for information about logical unit (LU) naming conventions. All of these topics are discussed in “Understanding Systems Network Architecture (SNA) Communication” on page 251.

Defining the Control Program (CP)

In the TPF 4.1 system, CCCTIN resides in the control program (CP) load module, and does not need to be the last CSECT in the control program.

Linkage Editing (LEDT)

Some customers have code that use the V-type constants (VCONs) that are generated by using the BEGIN and ENTxC macros as well as various tape macros. These VCONs have changed in the TPF 4.1 system. The following VCONs are no longer supported:

- Z0
- Z1
- Z2
- Z3
- Z4
- Z6.

You do not need to reassemble objects containing these VCONs, but if the Z1 and Z2 VCONs are coded outside the BEGIN macro header, they will be flagged as illegal. If they are coded within the BEGIN macro header, they will be ignored. The Z0, Z3, and Z4 VCONs are also ignored.

Objects that contain VCONs that are no longer generated but whose function still exists (such as ZN and ZD for ENTNC and ENTDC) do not need to be reassembled because the linkage editor (LEDT) will recognize these VCONs as no longer being supported, and resolve them to the proper fast-link linkage.

Because 24 bytes of the header generated by the BEGIN macro are no longer supported, the linkage editor (LEDT) removes this part of the header from the object modules that contain it. This allows you to leave the header in pre-existing programs.

Care must be taken, however, in programs that are not link edited, such as general file keypoints. General file keypoints must be reassembled against the TPF 4.1 BEGIN macro to remove this header. This is handled in SIP Stage II. Any Z1 VCONs that appear after the BEGIN macro header will be flagged as illegal during a load. Z1 VCONs should only appear in object modules that were not reassembled.

Z6 VCONs were generated by various tape macros prior to the TPF 4.1 system to resolve tape names. If these VCONs are present in the SAL table, they will be resolved like any other VCON. If they are not in the SAL table, LEDT will resolve the VCON to the 3 characters immediately preceding it, assuming it to be a tape name. This allows programs that were not reassembled against TPF 4.1 system macro libraries to be loaded. If this automatic VCON resolution is not desired, LEDT should be assembled with SYSPARM(Z6OFF) specified as an assembler option. If LEDT is assembled with this option specified and tape name VCONs are not present in the SAL table, the loaders will issue warning messages indicating that certain VCONs could not be resolved.

LEDT uses the system allocator (SALO) table, which has a new format for the TPF 4.1 system. To run LEDT, you must generate a new system allocator (SALO) table by running the system allocator (SALO).

Patching

Patches for programs that were assembled against the TPF 4.1 libraries will have the same displacement as the program listing. If you are patching programs that were assembled against the TPF 3.1 system or were compiled by a C compiler, subtract X'18' from the listing displacement to calculate the patch displacement. See "Operating Environment Requirements and Planning Information" on page 185 for information about the C compilers that are supported by the TPF 4.1 system.

Modifying Low Core

In the TPF 3.1 system, when you altered the LOCORE macro (which maps Page 0 and Page 1), you also had to modify some IBM-supplied values in the SKPAL input deck. In the TPF 4.1 system, if you make changes to the LOCORE macro that change the location of the fields providing Enter/Back linkage, you must reassemble the linkage editor (LEDT) along with the other programs that use the LOCORE macro.

Receiving Messages from the Online General File Loader (ACPL)

In the TPF 4.1 system, the online general file loader (ACPL) writes messages to the console using dedicated input/output (I/O) routines in the control program because the WTOPC facility is not yet available to the system. These messages will be highlighted on the 3270 console, and the console alarm will sound (resembling system error messages).

Customizing the Code

This chapter describes the changes that a programmer may need to make to customize the TPF code to ensure that installation modifications remain fully functional after migrating from the TPF 3.1 system to the TPF 4.1 system.

The following list summarizes these changes:

- Adapting to changes in the control program (CP) environment.
- Modifying user exit code in CCCTIN.
- Making changes in input/output (I/O) code for format-1 channel control words (CCWs).
- Replacing set system mask (SSM) instructions with \$MASKC macro calls to change the system state.
- Coding the new CRESVC macro for all new and existing SVCs.
- Reviewing changes to general and system macros summarized in “General and System Macros” on page 28.
- Converting any non-intercept modifications in data collection to control program (CP) code.
- Reviewing any modifications you made to the following areas because changes in these areas were extensive:
 - System error package
 - Data collection
 - Real-time trace (RTT) facility
 - E-type loader (OLDR)
 - Auxiliary loader (TLDR)
 - Customized code for address space awareness
 - Shutdown levels in enter processing. Shutdown tests are now based on SWBs rather than 128-byte blocks.
- Stopping the subtraction of the X'18' displacement from re-assembled code; this is no longer supported in the TPF 4.1 system.
- Using system work blocks (SWBs) rather than input/output blocks (IOBs) for work blocks and I/O.
- Using the CXFRC macro to get ECBs.
- Evaluating whether you can substitute SNAPC macro calls for SERRC macro calls, and tailor your dumps.
- Defining and initializing user CINFC labels.
- Adapting to changes in the control program environment.
- Redefining your SVCs for the new SVC structures.
- Using low address protection.
- Learning not to subtract the X'18' displacement between object code and listings.
- Using the input/output blocks (IOBs) for DASDservice only.
- Learning how to move data between address spaces.

This chapter also describes how to control and customize dump content in the TPF 4.1 system.

The TPF 4.1 Control Program Environment

There are several changes to the control program environment in the TPF 4.1 system:

- All control program code must run in 31-bit mode.
- The control program processes using format-1 channel control words (CCWs) and supports CCW indirect data addressing (IDAW) use. If you have your own control program channel programs or modify those provided by IBM, you must use format-1 CCWs, real addresses, and be aware of the 4 KB data page boundaries (or use IDAWs).
- The control program processes with the dynamic address translation (DAT) facility on.
- The control program processes with low address protection on. See “Modifying Low Storage” on page 233 for more information.
- The control program processes masked for input/output (I/O) (except at the top of the CPU loop and for fast-link macro services).
- CPU timer interrupts occur at the rate of 100 per second. (TPF 3.1 timer interrupts occurred at the rate of 20 per second.)
- The control program can write directly to a real-time tape (RTT) using the new \$TCPLC macro. (You needed an ECB to do this in the TPF 3.1 system.)
- The control program can write directly to an operator using the WTOPC facility. (You needed an ECB to do this in the TPF 3.1 system.)

Control Program User Exits

All user exit code in CCCTIN must be modified to run in the new control program environment. This affects the following user exits.

User Exit	Description
CT25	Reserves storage for user tables
CT26	Reserves storage for user Systems Network Architecture (SNA) tables.

New control program exits and changes to other control program exits are listed in “New, Changed, and Obsolete User Exits” on page 51.

Changes to Input/Output (I/O) Coding

The common input/output (I/O) routines now use format-1 channel control words (CCWs), which means:

- You must use format-1 CCWs.
- You must convert virtual addresses to real addresses before they can be used in CCWs.
- If you have user-defined device support routines and user-built CCWs, you must modify them accordingly.

Changing the System State

Use of the set system mask (SSM) instruction will cause problems with both the dynamic address translation (DAT) facility and the program event recording (PER) trace facility. To avoid these problems, replace SSM instructions with the new \$MASKC macro to change PSW system masks for I/O, external, DAT facility, and PER trace facility interrupts.

Macro Decoder and SVCs

In the TPF 4.1 system, 255 SVCs are allocated for use and 32 of these are reserved for your use. In addition, a new level of support is introduced in which two SVC entries (one for IBM and one for your use) can be reserved to support a second-level structure. With this secondary or indexed structure, an additional 32,767 macros can be defined. The macro decoder table uses the same primary supervisor call (SVC) table with 256 entries, which includes pointers to secondary SVC tables. SVCs in the secondary tables are called secondary or indexed SVCs, and are specified by adding a halfword index number to the SVC instruction.

The fast-link macro decoder service is unchanged but 100 entries are reserved for your use. In addition to the 32 SVC numbers, 100 fast link entries are reserved for your use.

A new set of macros allows you to define and maintain data in the primary and secondary SVC tables.

Macro Name	Description
------------	-------------

CFISVC	Returns the address of an SVC entry in the primary or secondary SVC table
CRESVC	Creates an entry in a macro information table
IBMSVC	Contains the IBM CRESVC calls
USRSVC	Contains user CRESVC calls.

See “Defining SVCs” for information about how to migrate your SVC entries.

The TPF 4.1 system supports the monitor call (MC) instruction for select macros (the SNAPC, \$MONTC, and \$RECV C macros) to allow transfer of control without damaging the register save area of the ECB.

Defining SVCs

Changes to SVC definition and structures are described in “Macro Decoder and SVCs”.

Up to 32,767 secondary SVCs and odd SVCs are now supported, and there is a new method for adding SVCs to the TPF 4.1 system. All new and existing SVCs must be added to the SVC tables using the CRESVC macro.

To Add New (Or Existing) SVCs to the TPF 4.1 System

1. Code the SVC service routine and the macro that starts the service routine. The SVC service routine should be in a copy member that is called by CCUEXT.
2. Code a CRESVC macro for each of these SVCs and place these calls into USRSVC. (USRSVC will use these entries to generate the macro decoder table and your secondary SVC tables.)

3. Assemble CCMCDC.
4. Link to CPS0 and STPP.

The CRESVC macro defines an SVC or fast-link macro to the TPF 4.1 system and adds the macro definition to the primary, indexed, or fast-link macro tables. Use the CKMAC parameter to specify the type of authorization (common block, key 0, MONTC, or restricted) required for specific macros.

The new CFISVC macro is used to access information in the macro information tables. The ISV0SV data macro maps the fields in the table entries.

Defining User CINFC Labels

The UCNFEQ macro allows you to define user CINFC labels. This is optional. The UCNFEQ macro is called exclusively by the CINFC macro, where the IBM CINFC labels reside. For IBM C language access, in addition to coding UCNFEQ, an entry in C\$UCNFEQ must be coded.

The IUCIN macro allows you to allocate space in the CINFC table for user CINFC labels. This is optional. The IUCIN macro is called exclusively by control program copy member CICR, where the CINFC table resides.

Once these macros are updated, CCNUCL and any segments that use the new labels must be reassembled.

Once the label is defined, it must be initialized. There are two ways of doing this: through the CT25 and CT99 user exits in CTIN. The CT25 user exit allows you to define an USAT entry and associate a CINFC label with it. The CT99 user exit will allocate the table and initialize the CINFC entry with the table address. CINFC labels not initialized by CT25 can be initialized by code added to CT99. This code should make use of the new CINFC address option.

The Monitor Call (MC) Facility

In the TPF 4.1 system, the Monitor Call (MC) instruction is used in the implementation of the following macros:

- SNAPC
- \$MONTC
- \$RECV.

This is to prevent the use of these macros from corrupting the ECB register save area. In the TPF 3.1 system, these macros were implemented as pseudo SVCs. See *TPF General Macros* for more information about the SNAPC macro. See *TPF System Macros* for more information about the \$MONTC and \$RECV macros.

The monitor call (MC) instruction has two operands:

- A 2-byte monitor class
- A 4-byte monitor code.

Masks in control R8 determine which monitor classes are active. The monitor code can be any 32-bit signed integer. The TPF 4.1 system uses a new monitor class for each new pseudo SVC.

The new CPSM copy member of CCCPSE contains the monitor call (MC) decoder and service routines (for which a new system stack was added).

Modifying Low Storage

Low address protection is a hardware facility that protects the first 512 bytes of storage against any alteration by a program regardless of the storage key used by the program. Not even the TPF control program can modify low storage while low address protection is active. Any program attempting to store into the first 512 bytes of each I-stream will take a program check when low address protection is active. Low address protection guards the part of the system that is most likely to be modified by a storage corrupter.

To ensure the integrity of the system, keep low address protection turned on. If you have programs that modify the first 512 bytes of memory, use the new LCPCC macro to turn off low address protection, then on again.

Changed Macros

Several macros have incompatible changes (changes that you must make to migrate to the TPF 4.1 system). See “General and System Macros” on page 28 for more information.

See *TPF System Macros* for more information about system macros.

Getting and Releasing System Workblocks (SWBs)

There are several new macros that the control program uses to get and release system work blocks. These macros are listed in “System Support” on page 277.

Internal Event Facility

In the TPF 4.1 system, you do not need to consider the size of the internal event facility table because it is dynamic. The TPF 4.1 system uses a hashing technique to locate entries and changes the size of the table as needed. When data in a block is passed by the \$CONBC and \$DISBC macros, the data is passed, not the actual block. Therefore, data in a core block cannot contain pointers to data in that same core block.

See *TPF System Macros* for more information about the \$CONBC and \$DISBC macros.

Data Collection Changes

In the TPF 4.1 system, data collection was converted to control program executable code (with the exception of intercept code). You must convert your nonintercept modifications to control program code, and move your intercept modifications to new real-time segments used for intercepts.

There are significant changes to program collector logic. Program intercepts are no longer collected. If you modified the IBM code in the area of program collection, your modifications may no longer be supported.

See the *TPF System Performance and Measurement Reference* for more information about data collection.

Critical Record Filing

You can identify up to six critical records for each multiple database function (MDBF) subsystem for filing in the case of a catastrophic error. The records are identified by slots in a parameter list. Each slot contains the core address and file address of the requested record, and is filled in by user-defined code.

For the TPF 4.1 system, you must check to ensure that any main storage addresses supplied to catastrophic error processing (CPSF):

- Are system virtual addresses
- Point to the correct high-storage primary global area on the main I-stream if you want to file a primary global record from an application I-stream. You can use the CMMGLBTB table in CCCIN to convert the addresses. The CMMGLBTB table is accessible with the CINFC tag.

Macro Trace

In the TPF 3.1 system, user exits were used to turn macro trace on and off. In the TPF 4.1 system, you can use the new ZSTRC command to turn macro trace on (ZSTRC ALTER macro) and off (ZSTRC ALTER NO macro). See “System Log Trace Facility” on page 298 for a description of the options.

Changes to the Real-Time Trace (RTT) Facility

In the TPF 4.1 system, the following changes were made to the real-time trace (RTT) facility:

- The RTT ECB is eliminated. All static data is in the CP CRTT segment of CCUTIL. A 4 KB common block is used as a trace buffer. If required, another common block is used for other RTT option tables.
- All RTT trace code was moved into the control program CRTT segment of CCUTIL. Start and stop processing code remains in real time segments.
- The trace control table is eliminated. RTT uses the new IBMSVC macro to get the address of each SVC entry in the system SVC table, which contains all trace control information.
- RTT uses a 4 KB common block as a trace buffer.
- Trace buffers are written to tape using the \$TCPLC COPY=YES CP tape write macro. No SVC or fast link application macros are issued from the trace code.
- The PTV Phase I macro group is no longer supported.
- RTT does not support the network option for the SLC network and BSC/ROUTC.

See the *TPF Program Development Support Reference* for more information about RTT.

Changes to the Selective File Dump and Trace (SFDT) Facility

In the TPF 4.1 system, the following changes were made to the selective file dump and trace (SFDT) facility:

- Selective file trace (SFT) code is in the CTSF segment of CCUTIL.
- The SFT initialization code is consolidated in BMD0; halt code is consolidated in BMD3.
- Selective file dump (SFD) code remains in the same real-time segments.

See the *TPF Program Development Support Reference* for more information about the SFDT facility.

Subtracting the X'18' Displacement

In the TPF 4.1 system, there is no longer a X'18' displacement between object code and listings. If you are subtracting this displacement in your customized code to calculate addresses, your code will be incorrect for reassembled programs.

Changes to Inter-I-Stream Communication

If you have your own inter I-stream communications code, you must make the following changes:

- Use system work blocks (SWBs) rather than IOBs for work blocks and input/output (I/O) (except for DASD service, which will continue to use IOBs).
- Use the CXFRC macro (rather than the assembler interface) to get ECBs. You cannot link directly to the GET_ECB routine.

Activating E-Type Programs

You can no longer use Keypoint 3 (CTK3) ENTNC expansions to activate E-type programs directly from the control program. In the TPF 4.1 system, code the ENTNC macro with the PROGRAM parameter to identify which program gets control when the ECB is activated.

Testing System Generation (SYSTC) Bits

In the TPF 4.1 system, it is possible to modify some of the system generation bits online by using the ZSYSG command. If you code a conditional branch (AIF) instruction to test the bit setting you will get the value at assembly time, which will be incorrect if the value was changed online by using the ZSYSG command. Instead, use the SYSTC macro to get the current setting of the bit.

Requesting MPIF Service

With the Multi-Processor Interconnect Facility (MPIF) feature a new ADSPACE parameter was added to the MPIFC macro. The MPIFC macro indicates the address space in which the code processes.

See the *TPF Multi-Processor Interconnect Facility Reference* for more information about the MPIF feature.

Changing the Fault-Rate Threshold

In the TPF 3.1 system, there were two fault-rate thresholds for processor errors:

- One for catastrophic processor failures
- One for non-catastrophic processor failures.

In the TPF 4.1 system, there is only a threshold for catastrophic processor failures. You can change this threshold, along with the fault-rate threshold for channel failures, by finding and modifying the constant in the EFL000 subroutine of the CMKH segment.

Moving Data Between Address Spaces

Programming in the TPF 4.1 system requires address space awareness, which is knowing whether you are in the ECB virtual memory (EVM) or system virtual memory (SVM), and what storage you can access:

- Control program macro services can see ECB virtual memory, and system virtual low and high mapped memory.
- ECBs can see EVM, and system virtual low memory and high mapped memory.
- Control program services can see all of system virtual low memory.

I/O servers process in the:

- EVM for macro service routines that switch to the SVM for initiating I/O and I/O interrupt routines
- SVM for I/O postinterrupt routines that switch to the EVM for returning to the user.

The control program uses the following new macros for managing the EVM and SVM address spaces.

Macro	Description
\$CONBC and \$DISBC	Connects and disconnects blocks to and from an EVM.
\$GEVAC and \$GSVAC	Converts addresses from any EVM to SVM, and SVM to any EVM.
\$SWSPC	Switches between the two address spaces.

You should minimize address space switching because the associated performance overhead is substantial.

There are several macros for which it is imperative that you know in which address space you are. These include:

- MPIFC
- SOUTC
- VALBC.

See *TPF System Macros* for more information about the MPIFC and SOUTC macros. See *TPF General Macros* for more information about the VALBC macro.

Modifying the TPF System Error Package

Changes to the TPF system error package for the TPF 4.1 system are extensive, especially in CPSE. If you are modifying this package, you must know:

- In which address space you are (EVM or SVM)
- When a routine is running with the dynamic address translation (DAT) facility on and off.

See the *TPF Main Supervisor Reference* for more information about the system error package.

Controlling Dump Content

Because processors are providing larger and larger storage sizes, and system tables are growing, dump size is now a serious concern. Not only can dumps become enormous, but while a dump is being written, the central processing complex is prevented from doing other work.

In the TPF 4.1 system, there are two ways to solve this problem:

- Substitute SNAPC macro calls for SERRC macro calls
- Control the content of your SERRC dumps.

The SNAPC macro does not pause the TPF 4.1 system and uses fewer processor resources than the SERRC macro. You can use the SNAPC macro for:

- Database corruption errors
- Hardware errors
- Any other errors where you understand the cause of the problem and less than 32 KB of data to document it fully.

You can control the content of your SERRC dumps by selecting which large areas or tables you want in certain dumps.

The relationship of the macros and tables described in the following sections is shown in Figure 7 on page 239.

To Control the Content of Your SERRC Dump

1. Define the areas of storage to be excluded from dumps. This is done by defining keywords and associating them with areas of storage.
2. Code dump overrides. This is done by mapping system error numbers to keywords.

See the *TPF Program Development Support Reference* for more information about dumps.

Defining Keywords

IBM ships a list of predefined keywords for large IBM storage areas in the new IDATB macro. These keywords are defined using IDATG macro calls. When IDATB is assembled, these calls generate entries in the selective memory dump table (SMDT). Entries in the SMDT represent data areas that are normally excluded from dumps. All of the IBM predefined areas start with I; for example, ICLH represents the CLH block management tables.

The IDATB macro contains a call to the UDATB macro, which contains user IDATG calls for your use. You can code your own IDATG calls to associate keywords with regions of storage that you want to exclude from (or include in) dumps using the IDATG calls in the IDATB macro as an example. You can also code IDATG DUMMY calls to generate SMDT entries that will be available for use when creating temporary keywords using the ZIDOT command. Include your IDATG calls in the UDATB macro.

Coding Dump Overrides

The areas defined in the SMDT will not be included in dumps unless a dump override is created for a particular system error requesting that a storage area be included. The IDOTB macro maps specific system error numbers to keywords,

creating dump overrides. The IBM dump overrides are coded on IDOTB macros in the CIDP segment. When the CIDP segment is assembled, these calls generate entries in the IBM static override bitmap table (SOBT).

You can code your own dump overrides using IDOTB calls in copy member CUDP of the CSECT CCUEXT user exit by using the IBM IDOTB calls in the CIDP segment as an example. Your IDOTB calls will generate entries in the user SOBT.

Once the TPF 4.1 system is up and running, you can use the ZIDOT command to:

- Associate system error numbers with keywords
- Override what is coded on the IDOTB calls
- Create additional entries in the SMDT (if you have coded dummy entries).

Coding Prefixes

You can code a prefix on IDOTB calls to distinguish between your own system error numbers and those provided by IBM. IBM reserves prefixes I, W, X, Y, and Z for its own use. You can use other prefixes to distinguish between or to group system errors. If you do not code a prefix, the prefix defaults to U.

The prefix determines which dump override tables the TPF 4.1 system will refer to when a system error occurs. (There is one exception to this. The ANSI C functions `exit` and `perror` cannot accommodate a prefix character, so you and IBM must share a single set of system error numbers for these functions.)

You do not need to code any of these macros or use the ZIDOT command to migrate to the TPF 4.1 system. Rather, you can use the selective memory dump table (SMDT) that is built by the IDATG calls that IBM provides. But, if you want to include areas that are excluded by default (such as the global areas), you can do one of the following:

- Remove the IDATG call from the IDATB deck that excludes the area you want included
- Code an IDOTB macro to override the entry (excluding the area) in the SMDT for certain system errors and include it in the CUDP copy member.

You do not need to reassemble all of your application programs or change all of your SERRC macro calls to use the new prefix capability. All IBM SERRC macro calls are prefixed with the letter I. The SERRC service code will supply a default prefix of U for all other code. When you issue the ZIDOT command to include or exclude specific areas in your dump, you must include the prefix. If you are allowing the prefix to default to U, code this prefix on the ZIDOT command or the IDOTB macro.

In summary, the IDATB and UDATB macros provide IDATG calls to the SMDT, mapping keywords to addresses of large storage areas. The areas identified in the SMDT are excluded from dumps.

The IDOTB macro allows you to associate specific system error numbers with the keywords contained in the SMDT. These dump overrides are contained in the static override bitmap table (SOBT) that applies (depending on the prefix, which reflects who has issued the error). The SOBTs are contained in the CIDP and CUDP copy members after assembly.

The ZIDOT command allows you to override the appropriate SOBT by creating entries in the dynamic override bitmap table (DOBT). The ZIDOT command also

allows you to create overrides for system errors for which no IDOTB macros were coded.

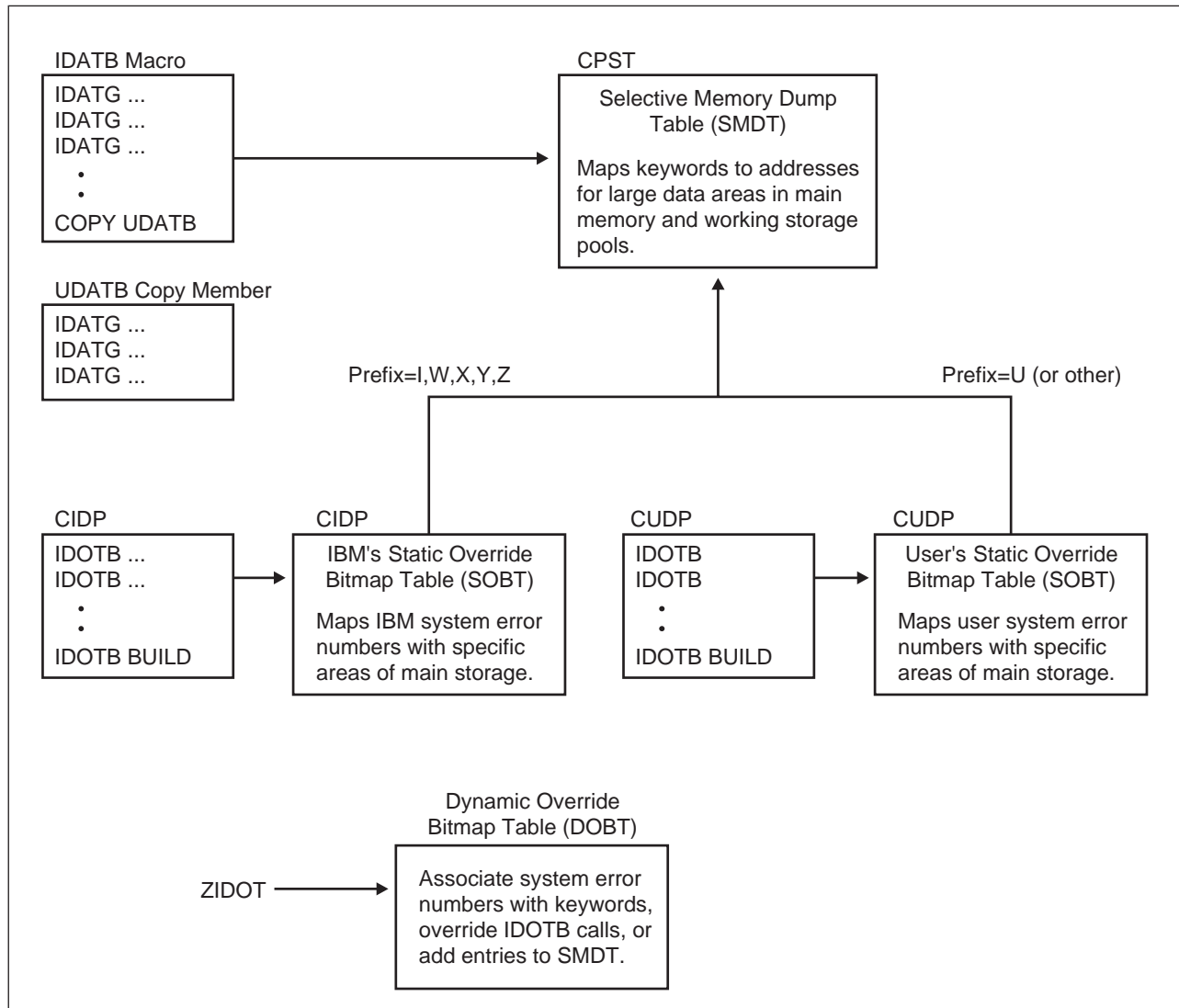


Figure 7. Components of Dump Content Control

Understanding Database Administration

This chapter describes the changes you may need to make in your database to migrate to the TPF 4.1 system.

There are changes in the following areas:

- File address reference formats (FARF)
- Size of program records
- Tuning virtual file access (VFA).

The changes for FARF are only required when the database is being migrated beyond FARF3. The program size and VFA tuning considerations, however, should be investigated.

The TPF 4.1 system uses only 4 KB programs so your DASD needs can change. In addition to evaluating these need consider packing, resegmenting, or combining programs into 4 KB records.

See the *TPF Database Reference* for more information about database administration and information presented in this chapter.

Expanded File Addressing Capacity and File Address Reference Format

Before this release, file address reference format 3 (FARF3) was the only file address format supported by the TPF system. This limited the address capacity of a TPF system to a maximum of 256 million fixed records and 384 million pool records. Pool addresses were, by definition, divided between long term and short term, duplicated and nonduplicated, and small or not small. The lack of addressing capacity prevented you from addressing the maximum number of DASD that could be attached to a TPF subsystem.

The TPF 4.1 system supports two new address formats:

- File Address Reference Format 4 (FARF4), which is a migration step between the present FARF3 address scheme and the new File Address Reference Format 5 (FARF5)
- File Address Reference Format 5 (FARF5), which further expands your file addressing capacity to approximately 4 billion (2^{32}) records.

FARF3 addresses, of course, are still supported and have not changed. In FARF3, only 27 or 28 bits are available for addresses. FARF3 addresses are recognized by the 1 in the 31st bit (bit 30). Figure 8 on page 242 shows the FARF3 address format.

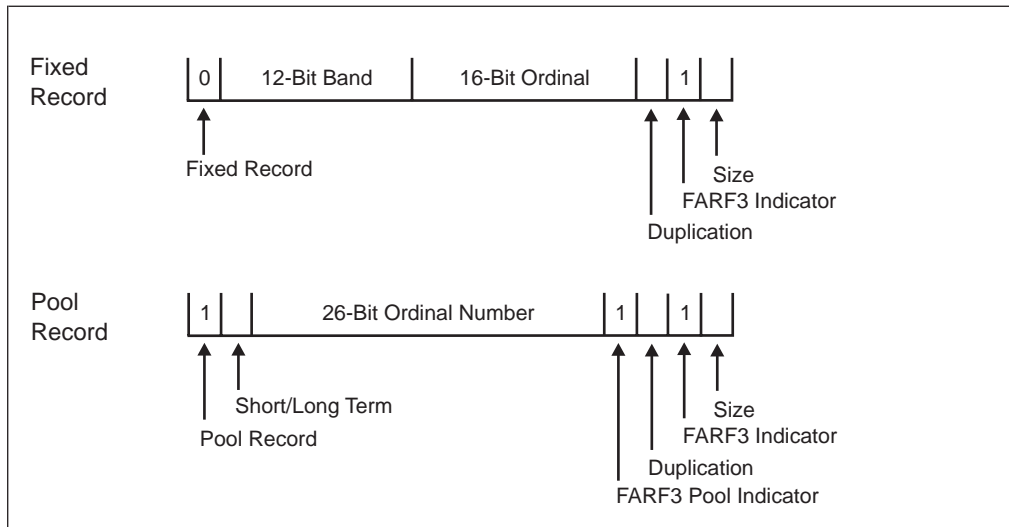


Figure 8. File Address Reference Format 3 (FARF3)

In the TPF 4.1 system, FARF4 and FARF5 have the following characteristics:

- FARF4 has about 433 million more unique addresses than FARF3, while FARF5 has about 3 billion more unique addresses available than FARF4. To achieve these addressing gains most of the control bits in the FARF3 addresses are reclaimed in FARF4 and all are reclaimed in FARF5.
- FARF3 and FARF4 addresses may coexist in the same database while FARF4 and FARF5 addresses may also coexist. FARF3 and FARF5 **cannot** coexist. When migrating from FARF3 to FARF4, the file address compute program (FACE) table contains only FARF3 or FARF4 addresses. When migrating from FARF4 to FARF5 the FACE table contains only FARF4 or FARF5 addresses.
- FARF3 and FARF4 addresses have an indicator bit. When the TPF 4.1 system expects only FARF3 or FARF4 addresses, it uses the indicator bit to distinguish between FARF3 and FARF4. When there are no FARF3 addresses in the TPF 4.1 system, a new FACE table containing only FARF4 or FARF5 addresses can be generated. When the new FACE table is loaded, the system only generates and decodes these addresses. The position of the FARF3 indicator bit in FARF5 is used for addressing.
- The FARF4 or FARF5 address format for a particular address is kept in the universal format type (UFT)/format type indicator (FTI) conversion tables, which are part of the FACE table. The FACE table can contain address references in either FARF3 and FARF4 or in FARF4 and FARF5 formats. The only difference between FARF4 and FARF5 addresses is the use of the two control bits in the FARF4 address.

Migrating File Addresses

There are three major steps for migrating your file addresses from FARF3 to FARF5.

1. All your file addresses must be in File Address Reference Format 3 (FARF3).
2. Migrating from FARF3 to FARF4.

When you migrate to FARF4 addresses, your file addressing capacity increases from approximately 640 million to 1 billion addresses (1G equals 2^{30} or 1,073,741,824). When you migrate to FARF5 addresses, your file addressing capacity increases to 4G. FARF4 addresses are an intermediate step between the FARF3 and FARF5 addresses. FARF3 and FARF4 addresses can coexist,

and FARF4 and FARF5 addresses can coexist. However, FARF3 addresses and FARF5 addresses cannot coexist. FARF4 addresses can be thought of as a migration path; migrating from FARF3 to FARF4 addressing, then from FARF4 to FARF5 addressing. FARF5 addresses can only enter the TPF 4.1 system when no more FARF3 addresses exist in the database.

The DUMPALTMODE parameter of the RAMFIL statement is provided as an aid to record migration. A SNAP dump (SNAPC macro) is taken to those records that are not in the address dispensing mode specified by the ZMODE command. The dump switches are manipulated by using the ZDECD command. See “Migrating from FARF3 to FARF4” on page 245 for more information.

3. Migrating from FARF4 to FARF5.

In the FARF4 to FARF5 migration stage, FARF4 and FARF5 addresses can coexist. FARF4 addresses are distinguished from FARF5 addresses in the UFT/FTI conversion table. Because FARF3 and FARF5 addresses are indistinguishable, they cannot be in the TPF 4.1 system at the same time. You must migrate completely to FARF4 before you can begin migration to FARF5.

See “Migrating from FARF4 to FARF5” on page 246 for more information.

Note: The migration stage determines which addresses can coexist in the database. In the FARF3 to FARF4 migration stage, FARF3 and FARF4 addresses can coexist. At this migration stage you can distinguish FARF4 addresses from FARF3 addresses by the 0 in the 31st bit (bit 30).

The Structure of FARF4 and FARF5

FARF4 and FARF5 are similarly structured using universal format types (UFT) and format type indicators (FTI). The UFT can range from 0 to 63. The UFT defines the size of the FTI, which in turn limits the size of the record ordinal numbers. If there are a large number of FTIs for a particular UFT, there is a correspondingly small number of record ordinals that can fit into each of those FTIs. When you code RAMFIL statements, you specify UFT/FTI combinations using the new UFTI4 and UFTI5 parameters for the records. One suggestion is to specify both FARF4 and FARF5 UFT/FTI combinations for the records, along with the existing FARF3 specifications. Another suggestion is to use UFTs 0 through 31 for pool addresses and 32 through 63 for fixed file addresses. The high-order bit is on for FARF3 pool addresses. This makes visible high-order bit testing that is not valid and must be eliminated when using FARF4 or FARF5 addresses.

Overall, the UFT/FTI design consists of one UFT conversion table with up to 64 entries. Each of these entries points to an FTI conversion table of variable size. Each FTI table is at least two entries long (because 1 bit is the smallest FTI length possible). Each FTI table entry provides a pointer to the appropriate FACE table entry (split). This FACE entry, combined with the record ordinal, yields the actual address of the record.

FARF4 address format is a restricted version of the more general FARF5 format. Figure 9 on page 244 shows the FARF4 address format.

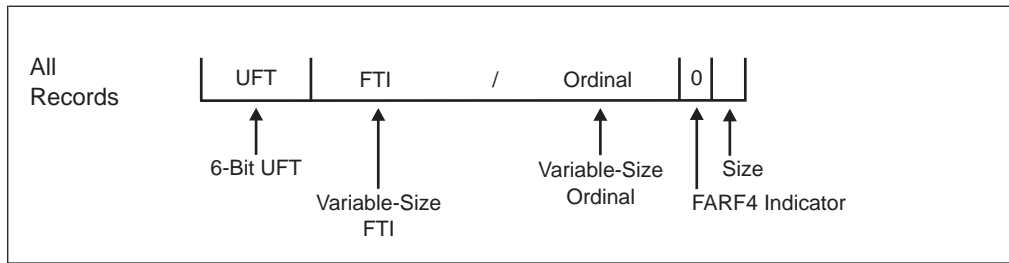


Figure 9. File Address Reference Format 4 (FARF4)

The FARF5 format is very similar to FARF4, except that the last 2 bits are available for the ordinal number. Figure 10 shows the FARF5 address format.

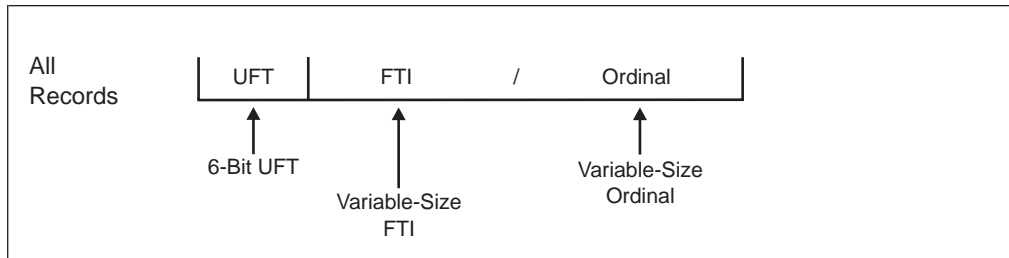


Figure 10. File Address Reference Format 5 (FARF5)

When UFT/FTI has FARF4 designators set up and UFTI4 definitions are added to the RAMFIL statements, a migration FACE table can be generated containing both FARF3 and FARF4 addresses.

The FACE table is built to reflect this stage. Addresses are dispensed initially in FARF3 format. When you are ready, you can dispense addresses in FARF4 format. You change address dispensing online by issuing the ZMODE command. This command specifies the preferred dispensing mode. If a record is not defined in the preferred mode, it is dispensed when requested in its defined mode.

In the FARF4 to FARF5 migration stage, addresses are dispensed initially in FARF4 format. When you are ready, you can begin dispensing addresses in FARF5 format by using the ZMODE command.

When you migrate to the TPF 4.1 system and build your new FACE table, you will be in FARF3 to FARF4 mode, with only FARF3 addresses. You can convert these addresses to the FARF4 format gradually by changing the dispense mode to FARF4 and coding UFTI4 on the corresponding RAMFIL statements. Preferred dispensing eases the transition by moving the database addresses to the next format as the database itself changes. Once you have converted all your FARF3 addresses to FARF4, you begin to migrate to the next addressing format by coding STAGE=FARF45 on the UFTFTI macro. Assuming UFTI5 combinations are coded on the RAMFIL statements generating a new FACE table based on them results in a FACE table supporting FARF4 and FARF5 addresses. When all your addresses are in FARF5 format, you achieve maximum addressing capacity.

Whether you are migrating from FARF3 to FARF4 or FARF4 to FARF5, you can have some record types that are defined in only one of the two supported address formats, and others that are defined in both. The value you coded on the MODE parameter of the UFT/FTI statement determines which mode addresses are dispensed for that record type, unless overridden by the ZMODE command. If your record type is defined in both supported address formats, addresses will be

dispensed in the currently specified dispensing mode (preferred mode). If your record type is defined in only one of the supported address formats, and this is not the current dispense mode, it will be dispensed in the mode in which it is defined.

If there are no imbedded FARF3 addresses in the database, the database can be immediately migrated from FARF3 to FARF5 (without passing through FARF4). This is done by following the same procedures suggested for migration from FARF4 to FARF5.

Database Reorganization Considerations

Imbedded file addresses present a difficult database reorganization problem. With FARF3 addresses, the primary concern is with keeping the band number and pool PSONS consistent. With FARF4 and FARF5 address, the UFT/FTI combination of the fixed file and pool record structure must be kept consistent.

Migrating from FARF3 to FARF4

This section discusses migrating from FARF3 to FARF4. During this migration, keep the following in mind:

- Once you make the transition to the FARF4 to FARF5 migration stage, FARF3 addresses are indistinguishable from FARF5 addresses. If a valid UFT/FTI combination exists for an unmigrated FARF3 address, undetected data corruption can result.
- Because each of you can have different database characteristics, IBM recommends that you write your own address conversion tools. You should exercise caution if you customize Recoup to convert addresses because Recoup does not access every pointer to every pool.
- You can use the new ZMODE command to display the current FARF dispense mode or change the dispensing mode. For example, enter the ZMODE D command to display the current dispensing mode; enter the ZMODE 4 command to set the current dispensing mode to FARF4.

To Migrate from FARF3 to FARF4

1. Your entire database must be in FARF3 format.
2. You must remove all dependencies on specific file address formats in both your application programs and system code.
To remove these dependencies, use the SONIC macro to determine address format, rather than testing control bits. The new ESFAC macro provides the extended feature of the SONIC macro. The address format interrogation portion of the SONIC macro was implemented in IBM C language support as well.
3. Code UFTFTI statements to structure the addressing for your database.
4. Code RAMFIL statements with the new UFTI4 and UFTI5 parameters. When you code your FARF4 RAMFILs, you should also code FARF5 RAMFILs so the system can determine there is enough addressing capacity to migrate to FARF5. The FARF5 combinations are not used to generate addresses in the FARF3 to FARF4 migration stage. The FARF3 information is not used in the FARF4 to FARF5 migration stage.
5. Run the FCTBG offline program to generate a new FACE table for the FARF3 to FARF4 migration stage.
6. Load the new FACE table and the TPF 4.1 code.
7. Reload CTHx segments because they contain embedded FARF addresses.
8. Allow embedded FARF3 addresses to age out or write a conversion tool to change them to FARF4 addresses.

9. Use the ZDECD command or the DUMPALTMODE parameter on the RAMFIL statement to flag any old FARF3 addresses. See "Making Sure All FARFx Records Are Removed" for more information.

Migrating from FARF4 to FARF5

This section discusses migrating from FARF4 to FARF5. You can use the new ZMODE command to display the current FARF dispense mode or change the dispensing mode. For example, enter the ZMODE D command to display the current dispensing mode; enter the ZMODE 4 command to set the current dispensing mode to FARF4.

To Migrate from FARF4 to FARF5

1. Ensure that all FARF3 addresses are removed from the TPF 4.1 system.
2. Specify STAGE=FARF45 and MODE=FARF5 on the UFT/FTI statement.
3. Code records with FARF5 indicators (UFTI5) in their RAMFIL statements.
4. Rebuild and reload the FACE table, COHx segments, and any other table that contains embedded FARF addresses.
5. When all FARF4 addresses are gone, regenerate and load a FACE table that only has UFTI5 specified on the RAMFIL statements.
6. Reinitialize the ZPTCH root file, which is located in the #IBMMS fixed file record, to rebuild the FARF4 addresses by entering **ZAREC LIBMMS.17 00 00000000**.

See the SYSEQ label for the appropriate ordinal numbers. See *TPF Operations* for more information about the ZAREC command.

7. Verify that the fixed file records containing imbedded file addresses do not have FARF3 addresses.

Making Sure All FARFx Records Are Removed

When in FARFn preferred mode request that records accessed by FARFn-1 addresses have a SNAP dump taken. This makes the record visible where it can be converted manually, if necessary. This is done by coding the DUMPALTMODE parameter on the RAMFIL statement for the record. When a record in an addressing format different from the current dispensing mode is decoded, the program issuing the decode is displayed in a SNAPC dump. Once this record is identified, the dump can be suppressed prior to changing the record to the current dispensing mode. The ZDECD command is used to alter the record attributes and suppress the dump.

The SNAPC dump (SNAP 1CA) for a record in the alternate file format contains the registers active at the time and the input/output block (IOB). The IOB supplies the file address of the record. By decoding this file address you can identify the alternate mode record and the program issuing the decode request. For FARF3 records, either the band number for a fixed file record or the ordinal of a pool record leads to the record type in the RAMFIL definition of the database. For FARF4 or FARF5, the file address is decoded into the corresponding UFT/FTI combination. You can identify the record by scanning the RAMFIL definition using this combination.

Selected activation of the DUMPALTMODE parameter on portions of the database is suggested. This approach will isolate the SNAPC dumps to certain parts of the database and will minimize the amount of effort required to suppress the dumps (enter the ZDECD command to do so) once the records are identified.

Accessing the File Address Compute Program (FACE) Table

In the TPF 3.1 system, there was one file address compute program (FACE) table for a subsystem user. In the TPF 4.1 system, there is one FACE table for a subsystem. Use the subsystem index (rather than the subsystem user index) when accessing the new FACE table structure.

Accessing Processor, SSU, and I-Stream Unique Records

You can use the new FACZC utility (similar to FACE and FACS) to access processor unique and I-stream unique records. In addition to expecting the same inputs as FACS, FACZC accepts a processor, SSU, and I-stream indicator passed in a register. The output for FACZC is the same as for FACS.

Unlike FACE and FACS, FACZC allows access to any records unique to any I-stream, SSU, or processor regardless of where the issuing ECB is running. When you are accessing a processor unique record that is a virtual file access (VFA) candidate, make sure that you are accessing the most recent copy. A later copy can reside only in the VFA of another processor.

Migration Considerations for Pools

In the TPF 4.1 system minor changes were made to pool directories. In this release there are two new fields.

Field	Description
CY3ORD	This field is equivalent to the CY3BON field without the control bits (that is, it is just an ordinal number).
CY3DIR	This is a fullword field that contains the directory ordinal number.

Note: Ordinals above 64K cannot yet be used because of constraints elsewhere in the TPF 4.1 system. The expansion was made in the TPF 4.1 system for future considerations.

Be aware that the ordinal is used to access the file address compute program (FACE) table. The file address in the directory is no longer used. The ordinal/record code check (RCC) is now written to the RTA for a released long-term pool type rather than the file address. In addition, you should use the SONIC or ESFAC macros to check the record attributes, rather than testing bits in the file address because some of the control bits disappear in FARF4 and they all disappear in FARF5.

The TPF 3.1 pool directories can be used as in the TPF 4.1 system. As the pool directories are brought into main storage during reorder, the CYAR segment initializes the new fields. The ZPOOL command should **not** be used to convert pool directories.

Note: The TPF 3.1 fields also remain. This is to allow fallback to a TPF 3.1 system.

DYOPM, the offline pool maintenance program, always generates the TPF 4.1 fields. DYOPM also fills in the TPF 3.1 fields when the TPF 4.1 system is still in migration mode. Migration mode exists while in the FARF3 to FARF4 migration stage. Once the TPF 4.1 system is in the FARF4 to FARF5 migration stage, fallback is no longer possible.

Attention: There are no major changes to the pool record layout in the TPF 4.1 system. You can use the same pool data structures as used in the TPF 3.1 system. If you choose to use the TPF 3.1 pool data structures, do **not** load a new keypoint 9 (CTK9). In addition, for ease of migration, CTK9 should have the same MCHR as found in the TPF 3.1 system.

Migrating Pool File Addresses

One suggested method for migrating imbedded pool file addresses is to remove imbedded pool file addresses and replace them with pool ordinal numbers and pool record type indicators. The FACE/FACS/FACZC macros were enhanced to accept a pool record type and a pool ordinal number (as follows here) and return a file address. You can use the following pool type names as if there were fixed record type names.

Pool Type Names	Description
#IPSLT	Small non-duplicated long-term
#IPSST	Small short-term
#IPSDP	Small duplicated long-term
#IPLLT	Large non-duplicated long-term
#IPLST	Large short-term
#IPLDP	Large duplicated long-term
#IP4LT	4K non-duplicate long-term
#IP4ST	4K short-term
#IP4DP	4K duplicated long-term

Note: This interface should never be used to obtain pool file addresses for pools that were not initially obtained through the GETFC macro.

Program Size and Segmentation

In the TPF 4.1 system, all E-type programs are 4 KB in size and reside in 4 KB file records. As a result, the amount of DASD you need to allocate for programs has grown, and could take up as much as three times the amount of space.

If DASD space is a consideration, you can conserve DASD by packing programs, resegmenting them, or combining them so that more than one program fits into a 4 KB record.

Virtual File Access (VFA)

To protect filed data from being overlaid, in the TPF 4.1 system the data is copied from the user core block into a virtual file access (VFA) buffer whether a candidate or not. As a result, VFA is active in all system states, with VFA delay file capability available only in NORM state. Noncandidates are flushed after they are filed.

Programs are run directly from VFA, improving the performance of file resident program enters.

New online and offline VFA performance monitoring facilities allow better tuning of VFA candidates and VFA resources.

There are also enhancements to the ZVFAC command that allow records to be flushed or purged from VFA by file address or record ID.

All DASD FIND and FILE macros, except the FDCTC macro, now interface with VFA.

There is a new interface from exception recording to VFA that allows VFA to leave the delay file attribute enabled while exception recording ends.

Tuning Virtual File Access (VFA)

IBM recommends that you use the virtual file access (VFA) package and that you use it for a while before tuning the following two new indicators:

- COUNT is the minimum number of references to a record in a VFA buffer that will keep it from being removed from VFA when a buffer is needed. (This count replaced the least recently used (LRU) algorithm.)
- RES381, RES1055, and RES4095 are percentages that determine the number of 381, 1055, and 4 KB buffers that must not have a file pending (in reserve) now that DASD file operations are run using the VFA buffers.
- If the VFA reserve chain is too small, it will take additional time to access the VFA buffers. If the VFA reserve chain is too large, there will be unnecessary DASD I/O. IBM recommends allocating 5 percent of the VFA buffers for the VFA reserve chain for a production system and 10 percent for a test system.

The processing of a FINSC or FILSC macro forces a flush of the VFA buffer if the record is currently in VFA.

Allocating Working Storage and Virtual File Access (VFA) Storage

IBM recommends increasing the working storage by a factor of 3 to 5 and increasing the virtual file access (VFA) storage by 20 percent.

For example, if you have 10 MB allocated for working storage and 60 MB allocated for VFA storage, increasing working storage by a factor of 3 to 5 and increasing the VFA storage by 20 percent would cause your working storage to grow to 30 to 50 MB and VFA storage to grow to 72 MB.

Understanding Systems Network Architecture (SNA) Communication

This chapter describes the changes (including system generation changes) that you may need to make in Systems Network Architecture (SNA) communication to migrate to the TPF 4.1 system.

There are changes in the following areas:

- Setting shutdown levels based on the size of the input list (rather than core block levels)
- Defining SNA resources
- Generating the SNA table
- Modifying SNA network definitions
- Changing all references to the network addressable unit (NAU) program (COVX) to use the INQRC macro
- Generating the SNA table
- Consolidating TPF/APPC application program names
- Converting network node names
- Understanding 3-byte resource identifier (RID)
- Reviewing changes to TPF Advanced Program-to-Program Communications (TPF/APPC), if you want to use this support. If you do not want to use this support, set SNAKEY parameters MAXSCB and MAXCCB to 0, and do not use the presentation services (PS) layer provided in the TPF system.

See the *TPF ACF/SNA Data Communications Reference* for more information about SNA SNA communication. Also see “Operating Environment Requirements and Planning Information” on page 185 for more information about the operating environment for SNA-based communication.

Systems Network Architecture (SNA) Communication

In the TPF 3.1 system, when new network definitions were installed, the network had to be brought down and all the processors in the loosely coupled complex had to be cycled down before the pilot tape could be loaded.

All large SNA tables were under 16 MB.

The Logon Manager allowed independent logical units (LUs) to use generic names for TPF application programs rather than secondary logical unit (SLU) thread names in session requests when the TPF system was defined to IBM ACF/VTAM Version 3 Release 4 or later release as a T2.1 node.

In the TPF 4.1 system, a pilot tape or general data set (GDS) contains new network definitions that can be loaded in NORM state without disturbing the network and without cycling all the processors in the loosely coupled complex to 1052 state. This is described in “ACF/SNA Table Generation Support” on page 210. If errors are detected during a dynamic load operation, a summary of LU names is sent to the receive-only computer room agent set (RO CRAS) console. If problems are found with the network definitions, you can fall back to the previous network definitions, regardless of how many CPUs may have incorporated the new resource definitions.

The following SNA tables are now above 16 MB:

- Resource vector tables (RVT) — parts 1 and 2 (RVT1, RVT2)
- Network address table (NAT)
- Subarea address table (SAT)
- System recovery table (SRT)
- Adjacent link station (ALS)
- Process selection vector (PSV) name table.

In the TPF 4.1 system, generic name support was expanded so that cross-domain LUs can also use generic TPF application program names in session requests when the TPF 4.1 system is defined to IBM ACF/VTAM Version 3 Release 4 or later releases as a T5 node across a channel-to-channel (CTC) connection. Also, TPF/APPC support will activate a session, if necessary, due to an ALLOCATE request from a transaction program. Two new parameters, CLU and QN, were added to the CTC statement of offline ACF/SNA table generation (OSTG) program to allow control point LU (CLU) sessions with the Logon Manager across CTC connections. See “Generating the Systems Network Architecture (SNA) Table” for more information.

Support for 3600 multithread with message recovery was dropped.

Defining Systems Network Architecture (SNA) Resources

You can use dynamic LU support to automatically create resource definitions for remote LU resources when these resources log on to applications in the TPF 4.1 system. There is no need to define these remote LU resources to the TPF 4.1 system using the OSTG program.

The same is true for ALS resources if the TPF 4.1 system is running in TPF Advanced Peer-to-Peer Networking (TPF/APPN) mode. You can automatically create resource definitions for ALS resources when the ALS links are activated. Again, there is no need to define these ALS resources to the TPF 4.1 system using the OSTG program.

You can also use the ZNDYN ADD command online to create resource definitions for the following resources:

- ALS resources (if the TPF 4.1 system is running in TPF/APPN mode)
- CDRM resources
- CTC resources
- NCP resources.

You must still use the OSTG program to create resource definitions for the other SNA resources, such as local applications and LU resources.

See the *TPF ACF/SNA Data Communications Reference* for more information about defining resources to the TPF 4.1 system.

Generating the Systems Network Architecture (SNA) Table

To use generic names in session requests from cross-domain LUs you must define a control point LU (CLU) for each CTC connection to VTAM. Code your OSTG CTC statement with the following new parameters.

Parameter	Description
CLU	Specifies the name of the CLU for this CTC. This parameter is only

required for CTC connections to VTAM when you are bringing up TPF/APPC sessions. If you are running loosely coupled, then you must specify multiple CLU names, one for each TPF processor in the complex (so that each TPF processor has its own CLU-Logon Manager session). You must define the CLU names to VTAM as a CDRSC.

If you specify the CLU parameter, you must also specify the new QN parameter.

If two CTC connections are defined between a TPF host and VTAM, you must have defined a CLU for at least one of them. IBM recommends that both connections have a CLU for load balancing across the two connections and to provide backup for each other in case one connection becomes unavailable.

QN

Specifies a qualifier number of two hexadecimal digits to uniquely represent to VTAM each CTC link as a path to a TPF application program. The QN parameter is required for CTC connections to VTAM if you want to bring up TPF/APPC sessions across them. The qualifier is appended to the TPF/APPC LU name and CPU ID when defining the alias name for the TPF/APPC LUs associated with this CTC connection. The alias names must be defined as a CDRSC to VTAM.

Note: When one TPF 4.1 image communicates through a channel-to-channel connection with another TPF image at a lower level, there may be an incompatibility when using a CPU ID greater than P. The existing TPF image can connect to the new TPF 4.1 image if the CPU ID of the new image is less than P. If the CPU ID of the new image is greater than P (that is, Q through Z or 0 through 9), it cannot be connected to the existing image.

On the ALS statement, the ALSQN parameter can also be coded with QN. The TPF 4.1 system still supports ALSQN.

Consolidating TPF/APPC Application Program Names Across CTC

In the TPF 3.1 system, if you wanted to access a TPF application program through both a gateway network control program (NCP) and an adjacent link station (ALS), you could use a single application program name by using VTAM interpret tables and gateway aliasing. However, if you also wanted to access the application program through a channel-to-channel (CTC), you had to define two application program names with two SIP MSGRTA macros and two corresponding VTAM definitions. The TPF 4.1 system solves this problem for CTC connections by adding suffixes to a single TPF/APPC LU name and creating a new alias name for each CTC connection as is already done for ALS connections. You can now code a single MSGRTA macro. Then you must code VTAM CDRSC definitions associated with the TPF CTC CDRM for the TPF application program alias names that are suffixed with the TPF CPU ID and the CTC qualifier number. Then you can change your remote host node application programs to specify the single generic name in their session requests.

Modifying Systems Network Architecture (SNA) Network Definitions

You can change the SNA network definitions by updating the input data sets for the OSTG program and then load the changed resource definitions to the TPF 4.1 system using the SNA fresh or dynamic load functions.

You can also change the resource definitions for non-LU resources online using the ZNDYN CHANGE command. Non-LU resources include the following:

- ALS resources
- CDRM resources
- CTC resources
- NCP resources.

See the following for more information:

- *TPF ACF/SNA Data Communications Reference* for information about changing a resource definition
- *TPF ACF/SNA Network Generation* for information about the OSTG program
- *TPF Operations* for information about the ZNDYN CHANGE command.

Converting Network Node Names

In the TPF 4.1 system, the network addressable unit (NAU) conversion program (COVX) is no longer supported. The segment is still provided for migration purposes. However, you should change all remaining references to use the INQRC macro.

TPF Advanced Program-to-Program Communications (TPF/APPC)

TPF Advanced Program-to-Program Communications (TPF/APPC) is an interface that allows TPF transaction programs to communicate with remote SNA nodes that have implemented the APPC interface using LU 6.2 protocols. In the TPF 3.1 system, the function provided by the TPF/APPC interface was a subset of the IBM APPC architecture in that it did not provide all the base functions defined by the LU 6.2 architecture.

In the TPF 4.1 system, TPF/APPC support includes the following base functions:

- Parallel sessions
- Local and remote initiation of change number of sessions (CNOS)
- Mapped conversations (IBM C language interface only). The support for mapped conversations is based on the CPI Communications. For additional information and details on the C language functions, see the *TPF C/C++ Language Support User's Guide*.
- TPF/APPC session initiation with ALLOCATE requests.

Note: There is one exception to this: PU 2.1 secondary LU (SLU) thread sessions cannot be activated from the TPF side.

- Limited resource sessions
- LENGTH and DATA parameters. The function of the LENGTH and DATA parameters exists in the TPF 3.1 system. However, the implementation in the TPF 4.1 system is enhanced. In the TPF 4.1 system, the LENGTH and DATA parameters are available on the RECEIVE and SEND_DATA verbs and the

LENGTH parameter is available on the POST_ON_RECEIPT verb. These enhancements allow you the flexibility of specifying where the data resides.

TPF/APPC also supports some of the optional functions defined by the LU 6.2 architecture, including:

- GET_TYPE verb
- CNOS CHANGE function
- ALLOCATE with RETURN_CONTROL=IMMEDIATE.

In addition, TPF/APPC support provides:

- A programmed operator interface for CNOS support that allows you to write user-supplied programs to control and maintain session limits
- A TPF command interface to drive the CNOS programmed operator interface so that you are not required to write programs to control and maintain session limits.

ROUTC extensions are no longer supported in the TPF 4.1 system. TPF/APPC must be used for LU 6.2 communications.

See the *TPF ACF/SNA Data Communications Reference* for information about how to use TPF/APPC support in the TPF 4.1 system.

Changes for 3-Byte Resource Identifiers (RIDs)

Even if you do not plan to use the TPF/APPC support, you must be aware of the following changes to the TPF 4.1 system that were made to support 3-byte resource identifiers (RIDs).

Area that Changed	Description of the Change
Routing Control Parameter List (RCPL)	<p>System recovery table (SRT) reference numbers were retired to make space available in the current RCPL. The major effect of this change is that the TPF 4.1 system no longer supports message recovery for 3600 multithread LUs. However, the TPF 4.1 system still supports message recovery for other device types already supported.</p> <p>The labels RCPLDESS and RCPLORGS are no longer supported, and these locations are now the start of the 3-byte RID, called RCPLDES3 and RCPLORG3. If you have 2-byte RIDs you can continue to reference the fields RCPLDESR and RCPLORGR to pick up the 2-byte RID value.</p>
INQRC	<p>The input and output parameter area to INQRC was modified to support 3-byte RIDs. When RIDs are specified as input to INQRC, the 3-byte RID starts at offset 1 in the parameter area, and the 2-byte RID starts at offset 2 in the parameter area. On output from INQRC, the 3-byte RID is at offset 1 in the parameter area (label INQRID3), and the 2-byte RID is at offset 2 in the parameter area (label INQRID).</p>

Area that Changed	Description of the Change
GET_SPA/NCB	<p>Segment CSNB now supports 3-byte RIDs; however, 2-RIDs are the default.</p> <p>If you have 2-byte RID support, you do not need to make changes in this area.</p> <p>If you have 3-byte RID support, you must turn on bit X'08' in the parameter byte (offset 4 bytes from the beginning of the input parameter area). This causes the RID to be returned in bytes 0 through 2 of the output parameter instead of bytes 0 through 1.</p>
RIDCC	RIDCC now returns a 3-byte RID at offset 1 in the output parameter area (RIDRID3). The 2-byte RID (RIDRID) is still located at offset 2 in the output parameter area.
RVTCC	RVTCC now returns a 3-byte RID in the specified return register. This change does not affect you if you have 2-byte RIDs.
ECB Work Area Changes	The SNA ECB work areas were changed to make room for 3-byte RIDs. The 2-byte RID, which was stored in EBW026–EBW027 and EBW038–EBW039, is now a 3-byte RID stored in EBW041–EBW043. EBW040 and EBW044 no longer contain copies of the RVT addresses. The 3-byte RID stored in EBW041 is the RID for the RVT containing the session information of the LU–LU session. The session partner field in the session RVT contains the RID of the partner LU.
PIU Trace Facility and ZNPIU	The PIU trace facility and ZNPIU were updated to display the full 3 bytes of the origin and destination RIDs.

In addition, these changes have occurred:

- The format of the internal TH has changed. TH1DAF and TH1OAF no longer exist.
- TH1SRID is now a 3-byte field that contains the RID of the RVT containing session information.

The RID is no longer a direct index into the resource vector table (RVT). In previous releases of the TPF system, programs could convert a RID to an RVT address through direct multiplication or by issuing the RIDCC macro to do the conversion. Now all programs must use the RIDCC macro to perform the RID-to-RVT conversion. In the TPF system, all TPF system code was changed to use the RIDCC macro but you will need to modify your own code, if any, that performs RID-to-RVT conversions.

Changes for the SNA Communication Trace Facilities

In the TPF 4.1 system, support for a new Systems Network Architecture (SNA) communication trace facility, which is the SNA input/output (I/O) trace facility, was added. See “Systems Network Architecture (SNA) I/O Trace Facility” on page 303 for more information about this trace facility.

In addition, various enhancements were made to the path information unit (PIU) trace facility and the PIUPRT utility. See “Path Information Unit (PIU) Trace Facility” on page 301 for more information about the PIU trace facility. See “PIUPRT Utility” on page 302 for more information about the PIUPRT utility.

Understanding Non-SNA Communication

This chapter describes the changes (including system generation changes) that you may need to make in non-Systems Network Architecture (SNA) communication to migrate from the TPF 3.1 system to the TPF 4.1 system. In addition to the protocols that are no longer supported, there are changes to the following protocols:

- Setting shutdown levels
- Synchronous link control (SLC)
- 3270 local support
- Setting shutdown and restart levels based on the size of the input list (rather than core block levels)
- Binary synchronous communication (BSC). If you use BSC support, review the changes in “Using Binary Synchronous Communication (BSC)” on page 258.

In addition, there were changes to the channel control word (CCW) pointer/CCP branch vector table.

See “Non-SNA Communication” for more information. Also see the *TPF Non-SNA Data Communications Reference* for more information about non-SNA communication.

Non-SNA Communication

The TPF 4.1 system supports the following non-Systems Network Architecture (SNA) protocols:

- 1052 console
- Local 3270
- Binary synchronous communications (BSC) on a 3745 communications controller with the 3745 EP
- Synchronous link control (SLC).

Support for the following non-SNA protocols was dropped:

- EP/ALC — ALC customers should use the network extension facility (NEF) or Airlines Line Control Interface (ALCI) instead.
- ARINC — no longer in use.
- Asynchronous teletype communications (TTY), which includes:
 - Low-speed controlled telegraph (LSCT)
 - Low-speed free running telegraph (LSFR)
 - Asynchronous link control.

IBM recommends AX.25 as a replacement for low-speed lines.

- BSC on 3705 — Use the 3745 emulation program (EP) rather than the 3705 EP. Cannot be a tributary station on a multi-point line. Also, VTAM CMC should handle loading, dumping, and tracing of the 3745 EP.

In the TPF 4.1 system, non-SNA communication shutdown levels are based on the number of items on the input list rather than on the number of blocks available in the system. Polling stops when the number of items on the input list exceeds the shutdown level and restarts when the number of items on the input list is below the restart level. There is no longer a secondary shutdown level for SLC and BSC.

Setting Non-SNA Communication Shutdown Levels

In the TPF 3.1 system, non-SNA communication shutdown values were based on core block levels. In the TPF 4.1 system, communication shutdown levels are based on the size of the input list. In general, these values can be set to shut down early, and then fine tuned based on TPF data collection reports.

See “Operating Environment Requirements and Planning Information” on page 185 for more information about the operating environment for non-SNA-based communication.

Using Synchronous Link Control (SLC)

In the TPF 4.1 system, synchronous link control (SLC) support changed in two ways:

- SLC now runs in 31-bit addressing mode
- The control program (CP) uses the new SLCQC macro to manipulate SLC queues.

To use SLC support in the TPF 4.1 system, you need to use the number of messages on the input list (rather than core block levels) to set the shutdown and restart levels for SLC processing. These levels are specified on the AIDWN and AIRES parameters of the CCPOL macro.

There are also internal changes that do not require any action on your part:

- Coding

VM=N0

on the SIP CONFIG macro no longer affects the assembly of the following SLC control program segments:

- CLQE (CCCCP3)
- CLQG (CCCCP3)
- CLQM (CCCCP3).

In addition, coding VM=N0 on the SIP CONFIG macro no longer affects the following E-type programs:

- CML2
- CML4
- CML6.

This code is now assembled as if you coded VM=YES, regardless of whether you are generating a system to run under VM.

- The master control record (MCR) file type is now defined as a virtual file access (VFA) candidate with immediate filing.

Using Binary Synchronous Communication (BSC)

To use binary synchronous communication (BSC) support in the TPF 4.1 system, you need to make the following changes:

- Use the number of messages on the input list (rather than the core block levels) to set the shutdown and restart levels for BSC processing. Specify these levels on the BSDWN and BSRES parameters of the SIP CCPOL macro.

- Use 3745 partitioned emulator processor (PEP) generation, with the following parameters.

LNCTL=BSC

BSC group definition.

CLOCKING=EXT

Modems use external clock.

SPEED=2400

Bits for each second.

DUPLEX=HALF

Half duplex (1D) lines.

CU=2703

Simulate 2703 transmission control.

MODEM=OPTION2

Host must enable lines.

NEWSYNC=NO

Do not send New-Sync to modem.

TYPE=EP

All lines always operation in emulation program (EP) mode.

- Code the following parameters for each BSC line.

ADDRESS=(xxx, yyy-z)

Where:

xxx

Is the port.

yyy

Is the subchannel.

z

Is the channel adapter address.

TADDR=chars

Is needed for the tributary line only where:

chars

Is the polling character.

- Define the high and low subchannels used by the EP support using channel adapter GROUP definitions.

Using 3270 Local Support

Use the number of messages on the input list (rather than the core block levels) to set the shutdown and restart levels for 3270 local processing. Specify these levels on the L70DWN and L70RES parameters of the SIP CCPPOL macro.

Referencing the CCWP and BVT Tables

In the TPF 4.1 system, the CCW pointer/CCP branch vector table is divided into two tables:

- CCWP table
- BVT table.

Each entry is 4 bytes. The same interrupt control tags (CPMVCW, CPMVBV, CXNVBV, CXNVCW, and CXNCTL) are used to reference these tables. However, the CINFC tags are different.

In the TPF 3.1 system, there was one CINFC tag (CMMCTL). In the TPF 4.1 system there are two CINFC tags:

- CMMVCW for the CCW
- CMMBVT for the branch vector table.

Changes to Channel Control Word (CCW) Areas

There are three changes to channel control words (CCWs):

- The address of a data block in a format-1 CCW must be a real address.
- The system virtual address (SVA) of the block is saved in the CCW area for interrupt processing.
- The TPF 4.1 system now uses system work blocks from sense information rather than input/output blocks (IOBs).

In the TPF 3.1 system, the ordinal number was kept in the CCW area. In this release, the address of the sense data core block is kept in the CCW area.

Understanding Operations

This chapter describes operational differences between the TPF 3.1 system and the TPF 4.1 system. Most commands that are new, changed, or no longer supported do not require action on your part to ensure a successful migration. Changes to commands (also known as Z-messages) are summarized in “New, Changed, and Obsolete Commands” on page 62. Also see *TPF Operations* for a complete description of these commands.

This chapter provides additional information about some of the commands, as well as information on processing multiple-volume tape dumps and channel and machine check handlers.

The following list summarizes the operational changes you must make to migrate to the TPF 4.1 system:

- Review changes to commands summarized in “New, Changed, and Obsolete Commands” on page 62. Reviewing the changes to command is especially important if you are using any automation programs that may be affected by message changes.
- Modify your JCL for multiple-volume tape dumps and post processing.
- Review the new and changed system error dump options.
- To recover from a disabled wait state code, issue IPL CLEAR.
- If you have operating procedures keyed to messages from the channel and machine check handlers, adapt these procedures for fewer messages.

Multiple-Volume Tape Dumps and Post Processing

In the TPF 4.1 system, dumps can span more than one tape volume. For this reason, a standby real-time tape (RTL) or alternate (ALT) tape must be available for switching at all times. (Automatic tape mounting makes this easier by automatically mounting the next tape in the 3480 stack loader as an ALT tape.) If a tape is not available during a multiple-volume dump, the dump is aborted, and an error message is issued.

You may also need more than one tape volume to post-process a dump. In the postprocessing JCL, you can specify multiple-volume serial numbers, either on separate DD statements as shown in Example 1, or by coding multiple-volume serial numbers and coding the OPTCD=B option on the DCB parameter as shown in Example 2:

Example 1

```
//SYS000 DD DSN=RTA.TAPE,UNIT=TAPE,LABEL=(,SL),DISP=(SHR,PASS),
//          VOL=SER=RTATA1
//          DD DSN=RTA.TAPE,UNIT=TAPE,LABEL=(,SL),DISP=(SHR,PASS),
//          VOL=SER=RTATA2
```

Example 2

```
//SYS000 DD DSN=RTA.TAPE,UNIT=TAPE,LABEL=(,SL),DISP=(SHR,PASS),
//          VOL=SER=(RTATA1,RTATA2),DCB=OPTCD=B
```

The OPTCD=B option of the DCB parameter causes QSAM access method to unconditionally perform volume switch whenever end-of-reel is encountered, until the volume serial list is exhausted. This allows you to control whether *spanned*

tapes are processed by simply adding to or deleting from the list of volume serial numbers on the DD statement. You must keep track of which volumes contain which dump, and specify the volumes for postprocessing in the same order in which the tapes were written. You must also use standard label processing.

If you do not specify multiple tape volumes for postprocessing, and additional tapes are needed, the System Test Post Processor (STPP) will abend with the message:
NEXT VOLUME NEEDED TO CONTINUE PROCESSING.

STPP cannot postprocess multi-volume dumps under VM, because CMS does not support concatenation of tape data sets under OS simulation.

In the TPF 4.1 system, STPP routes all messages to the data set specified on the SYSOUT DD statement. Job-specific messages no longer display on the IBM MVS operator console.

Modifying System Generation Option Values

You can enter the new ZSYSG command to modify a selected number of system generation settings (using keywords) that are initially set by system initialization program (SIP).

Keyword	Description
KPFBK	Keypoint fallback
VEQR	Virtual-equals-real mode
CLEAR	Clear block during GETCC (associated with the IBM TPFDF user exits)
TPFDF	IBM TPFDF user exit

System generation bits that require the reassembling of programs, allocator changes, or the rerunning of SIP if they are changed cannot be modified using this message. Changes made take effect on the next IPL of the system.

Modifying Storage Allocation Values Online

You can use the new ZCTKA command to modify various storage allocation values (using keywords) after a system is generated.

If multiple database function (MDBF) was generated, the ZCTKA command may be issued from any subsystem. However, certain subsystem-shared values cannot be changed from subsystems other than the BSS. Block allocation values changed are the number of blocks allocated in the subsystem from which the message was issued. If more than one subsystem was generated, block allocation values for the entire system cannot be changed using the ZCTKA command, but they can be viewed using the ZSTAT command. Changes made take effect on the next IPL of the TPF 4.1 system.

The following lists the keywords that are valid for:

- Storage block allocation
- Control program table allocation
- Tape processing.

Specifying and Overriding System Error Options

In the TPF 3.1 system, you could specify which core blocks you wanted to include in a dump with a positional parameter. This option, and several others, were removed. In the TPF 4.1 system, the primary purpose of the ZASER command is to tell the TPF system where you want your dump and console message routed. Also, on the ZASER command, some options:

- Were combined
- That were made up of two words were replaced by one word by one word (for example, NO DUPL became NODUPL)
- Were renamed for consistency.

Options that Changed for the ZASER Command

Table 42 summarizes the differences between the TPF 3.1 system and TPF 4.1 system system error (SERRC) dump options. (Options that are not changed are not included in the table.)

Table 42. Changes to the System Error Options for the ZASER Command

TPF 3.1 System	TPF 4.1 System	New, Changed, or No Longer Supported?	Description of Changes
DUPL NO DUPL	DUPL NODUPL	Changed	Changed NO DUPL to one word.
DUMP NO DUMP	DUMPON DUMPOFF	Changed	Changed to be consistent with other options.
CRAS NO CRAS	CONSON CONSOFF	Changed	Changed to be consistent with other options. CONSON routes system error messages to the system console; CONSOFF suppresses routing of system error messages to the system console.
ALLW NDM	CONSDMP	New	Log messages when a dump is generated. This option replaces ALLW NDM.
SUPP NDM	Not Applicable	No Longer Supported	Not Applicable
STRACE DTRACE	Not Applicable	No Longer Supported	Not Applicable
SEL CORE ALL CORE	Not Applicable	No Longer Supported	Not Applicable
HALT CONTIN	Not Applicable	No Longer Supported	Not Applicable

Table 43 on page 264 summarizes the differences between the TPF 3.1 system and the TPF 4.1 system snapshot (SNAPC) dump options. (Options that are not changed are not included in the table.)

Table 43. Changes to the Snapshot Dump Options for the ZASER Command

TPF 3.1 System	TPF 4.1 System	New, Changed, or No Longer Supported?	Description of Changes
DUPL NO DUPL	DUPL NODUPL	Changed	Changed NO DUPL to one word.
DUMP ON DUMP OFF DUMP MSG	DUMPON DUMPOFF DUMPMMSG	Changed	Changed options to one word.
DUMP ALL	Not Applicable	No Longer Supported	Replaced by DUMPON.
DUMP TAPE	TAPE	Changed	Changed to one word.
DUMP PRT	PRT	Changed	Changed to one word.
CONS ON	Not Applicable	No Longer Supported	Replaced by CONSALL.
CONS OFF CONS MSG CONS ALL	CONSOFF CONSMSG CONSALL	Changed	<p>Changed options to one word.</p> <p>In the TPF 3.1 system, CONSALL was a suboption of CONSON.</p> <p>In the TPF 4.1 system both options are combined in CONSALL.</p>

The new ZIDOT command allows you to specify additional areas of main storage to be included in a dump for a particular system error, to bypass processing of a particular system error, and to display the current status and overrides for a system error.

See *TPF Operations* for a complete description of the ZASER and ZIDOT commands.

System Error Support

Before this release, you could specify the content of dumps in two different ways:

- On the SERRC macro
- By using the ZASER command.

Dumps were divided into three sections:

- I-stream status, trace tables, ECB and attached blocks
- Permanent core, controlled by the selective dump address table in CCCPSE
- Working storage pools.

Beginning with this release, the TPF dumps are divided into two sections:

- I-stream status, trace tables, and ECB virtual memory (EVM)
- System storage areas, controlled by the selective memory dump table. You control the content of dumps by using the selective memory dump table (SMDT) and the dump override table (DOT).

You can use the new optional PREFIX parameter on the SERRC macro to define multiple sets of system error numbers. The prefix character you specify will appear

at the beginning of the system error number. All IBM system errors begin with the letter I. The letters W through Z are reserved for future use by IBM. User system errors will default to the letter U.

Use the new LIST parameter to specify additional main storage areas to be dumped. The CLIST parameter is no longer supported in the TPF 4.1 system. The SLIST parameter is still supported. See “Controlling Dump Content” on page 237 for more information.

For operational (OPR) dumps, you only get the ECB virtual memory (EVM) unless you enter the ZASER command with the LONG parameter specified. For control (CTL) dumps, the SMDT replaces the selective dump address table.

In addition, in the TPF 4.1 system:

- Dumps can span multiple tape volumes
- System error options are no longer subsystem unique
- SNAPC dumps are unchanged.

You can also start the dump data user exit to present ECB-controlled SERRC and SNAPC data. For SERRC dumps, a subset of the dump data will be presented to the user exit.

The new DATAX and NODATAX parameters for the ZASER command activate and deactivate this user exit. The dump data user exit cannot be controlled independently. The ZASER command with the DATAX parameter specified turns on the data exit for both SNAPC and SERRC dumps.

See *TPF Main Supervisor Reference* for more information about system error support.

Modifying Dump Tags

The format of the alter dump tag (ZADCA command) has changed and there is a validation option allowing you to verify up to 16 bytes of data that you want to modify. If the validation data does not match, an error message is issued and no modification is done.

Multiple TPF Images

In the TPF 3.1 system, testing changes to a TPF system required bringing down the system, scheduling planned downtime for system loads, and re-IPLing the loader general file for fallback.

In the TPF 4.1 system, multiple TPF images allow you to integrate changes in a TPF environment by:

- Performing loads in NORM state without destroying your existing program base
- Falling back immediately to a previous program base with a single IPL without re-IPLing your loader general file.

Multiple TPF images allow you to have up to 8 images. One primary image is designated for use during a hard initial program load (IPL). Each image has:

- A unique core image restart (CIMR) area
- A pointer to an IPL area (IPLA and IPLB)
- A pointer to a program base

- Its own keypoint load staging are to facilitate the pre-loading of keypoints in NORM state.

You can define up to 8 images (CIMR and keypoint staging area), up to 8 program bases, and up to 4 IPL areas.

You can run different images on separate processors in a loosely coupled complex as long as the system structures, including the FCTB and RIAT, are compatible.

When you IPL the loader general file (LGF), the online general file loader (ACPL) writes the loaded system components to image 1. The auxiliary loader (TLDR) writes loaded system components for the other images. TLDR now supports output to general data sets (GDSs) tape, user-defined media, and virtual reader.

Note: Virtual reader refers to the IBM VM/ESA facility for supplying input to a virtual machine. A full load must be done when you are loading to an image using a new program base.

Keypoint X (CTKX) no longer exists as a keypoint. CTKX is the image-unique image pointer record that contains information about keypoints and CIMR components.

The following two CIMR components are no longer supported:

- APTV
- CGOT.

The APTV and CGOT components are replaced by two user-defined CIMR components:

- USR1, which is subsystem shared
- USR2, which is subsystem unique.

New Keypoint CTK5 occupies the slot vacated by Keypoint CTKX. This keypoint is reserved for IBM use.

See *TPF System Installation Support Reference* for more information about how to use multiple TPF images.

The ZIMAG command allows you to modify and display images and their components. See “Modifying and Displaying Multiple TPF Images” for more information about this command. Also see *TPF Operations* for a complete description of the ZIMAG command.

Modifying and Displaying Multiple TPF Images

The new ZIMAG command allows you to define, delete, modify, display, and manipulate components of TPF images.

DEFINE

Allows you to define (or redefine) up to 8 images.

DISPLAY IMAGE

Displays the image name, status, associated IPL and program areas, CTKX version code (if physically loaded), and CIMR component.

ENABLE

Allows you to enable an image for an IPL.

PRIMARY

Defines an enabled image as the primary image. The primary image is used during a hard IPL and is valid only on the basic subsystem (BSS).

DISABLE

Disables an enabled image so that it cannot be IPLed.

CLEAR

Deletes a disabled image.

COPY

Allows you to copy core image restart area (CIMR) components from one image to another by reference (logically) or physically.

New options were added to the COPY parameter that enable you to copy the IPL and program areas between the source and target images.

UNREF

Deletes the logical references of CIMR components from a disabled image.

MAKEPHYS

Allows you to make all of your CIMR component references physical copies.

DISPLAY PROG

Displays all of the program areas defined in the TPF 4.1 system and identifies which (if any) images they are associated with.

DISPLAY IPL

Displays all the IPL areas that were loaded and identifies which (if any) images they are associated with. This option also displays IPLA and IPLB information for each area.

DISPLAY PROCESSOR

Displays the image associated with each processor in the complex, as well as the status of the processor.

Keypoints

You can use the keypoint staging area to store copies of keypoints that you want to test. When you activate these keypoints (by moving them to the working area and IPLing), a backup copy of the working keypoints is saved for fallback purposes. Therefore, at one time, you could have the following copies of the keypoints:

- Working keypoints, which are used by all of the processors in a complex, regardless of which images are active
- Keypoints that were loaded to some or all of the staging areas
- Backup keypoints.

Although the staging area keypoints are image-unique, the working keypoints and backup keypoints are not.

The following options for the ZIMAG KEYPT command let you manipulate these keypoints.

MOVE

Allows you to move keypoints from the keypoint staging area of an image to the working keypoint area.

RESTORE

Allows you to move the backup copy of the keypoints to the working keypoint area (keypoint recover). All processors, other than the one for which the command was issued, must be in STOP state.

CONT

Required after a KEYPT MOVE or RESTORE (to allow the MOVE or RESTORE to continue after you have determined that the processors are in the required states).

ABORT

Ends the KEYPT MOVE or RESTORE.

DELETE

Enables you to remove keypoints from the keypoint backup area. Enter the command with this option **before** a KEYPT MOVE if there are backup copies of the keypoints that you want to move.

DISPLAY

Displays working (active) storage area or backup keypoints.

Use the ZTPLD command to load program data to an image from tape, general data set (GDS), user-defined media, or virtual reader. See *TPF Operations* for a complete description of the ZTPLD command.

Modifying and Displaying the Program Allocation Table

You can change or display the program allocation table (PAT) using the new ZAPAT and ZDPAT commands. Changes to the core copy of the PAT take effect immediately. Changes to the file copy of the PAT take effect when you perform an initial program load (IPL) of the TPF system.

See *TPF Operations* for a complete description of the ZAPAT and ZDPAT commands.

Assigning Data Definition Names to Input Devices

There are two new ZDSMG commands in the TPF 4.1 system. You can use the ZDSMG DEFINE command to assign a data definition name to an input device. You can use this data definition name to access the input device if you use the Data Set utility. You can use the ZDSMG RELEASE command to remove a data definition name from the TPF system. Once you release a data definition name, it is not redefined when you perform an initial program load (IPL) of the system.

Because the TPF 4.1 system now supports a number of new input devices, the ZDSMG DISPLAY command was changed to display information about tape, virtual reader, and user-defined input devices, as well as general data set (GDS) input devices.

See *TPF Operations* for a complete description of the ZDSMG command.

Loading E-Type Programs

There are a number of new E-type loader functions that you can use to load E-type programs to the TPF 4.1 system. The following information describes the parameters for the ZOLDR command that you use to perform these E-type loader functions. You can enter the ZOLDR command in any system state.

See “E-Type Loader” on page 225 for more information about the E-type loader. See *TPF Operations* for a complete description of the ZOLDR command.

ACCEPT

Replaces the programs at the allocated addresses with the versions of the

programs that are contained in a specified loadset. Once the programs are replaced, the E-type loader deletes the loadset and returns to the TPF 4.1 system the fixed file records that were occupied by the programs in the loadset. There are no fallback capabilities once you accept a loadset.

ACTIVATE

Makes the programs in a specified loadset available for use by new ECBs. When you activate a loadset, all of the programs contained in that loadset become available for use at the same time, regardless of whether the programs reside in main storage or on file. You can load and activate more than one version of the same program provided that the various versions are contained in different loadsets. You can activate a loadset on specific processors or on all processors. You can also restrict the use of the programs in the loadset to specific ECBs providing you code the necessary function using the E-type loader selective activate user exits.

ALTER

Changes the allocation characteristics of unallocated programs that are loaded and activated using the E-type loader, and changes the following E-type loader default values:

- Threshold value for the number of extra PAT slots
- Threshold value for the number of E-type loader fixed file records
- Maximum number of incompatible PAT slots to report before ending the E-type loader load function
- Time interval for starting the E-type loader policing routine
- Time interval for starting the E-type loader long running job detection and reclaim detection routine.

CLEAR

Clears and initializes all the file-resident E-type loader structures.

DEACTIVATE

Prevents new ECBs from entering the programs contained in a specified loadset. This function allows you to fall back to previous versions of programs. You can deactivate the loadset on specific processors or on all processors. You can also force active ECBs to exit if they attempt to use the programs in the deactivated loadset. You can specify whether the ECBs should issue a system error dump when they exit.

DELETE

Deletes a loadset and returns the E-type loader fixed file records to the TPF 4.1 system.

DISPLAY

Displays information about loadsets, specific programs contained in loadsets, the current program allocation characteristics, and the E-type loader default values that are currently defined in the system.

EXCLUDE

Removes one or more programs from a specified loadset. When you exclude a program from a loadset, it is **not** deleted. The program can be added to the loadset again using the reinclude function.

LOAD

Reads sets of programs from an input device. These sets of programs are called *loadsets*. The programs are put into fixed file records, but cannot be used until they are activated. These fixed file records are returned to the system when the delete or accept function is performed on the loadset. You can also use the load function to allocate programs to the online system.

RECLAIM

Rebuilds the E-type loader database to recover any E-type loader fixed file records that were lost.

REINCLUDE

Adds one or more programs to a specified loadset. Only programs that were previously excluded from the loadset can be reincluded in the loadset.

Loading and Activating New Versions of Programs

There are many differences between loading E-type programs in the TPF 3.1 system and loading E-type programs in the TPF 4.1 system. These differences are compared in Table 44.

Table 44. Loading and Activating New Versions of Programs

TPF 3.1 System	TPF 4.1 System
<ol style="list-style-type: none">1. Create an OLD tape that contains the programs you want to load to the TPF system by running the offline job OLDR.2. Enter the ZOLDR LOAD command to load the programs. Once the load function is complete, the programs are available to the TPF system.	<ol style="list-style-type: none">1. Create loadsets that contain the programs you want to load to the TPF system by running the offline job OLDR.2. Enter the ZDSMG DEFINE command to assign a data definition name and device type to the input device that you specified in the JCL for the offline job OLDR.3. Enter the ZOLDR LOAD command to load the loadsets.4. Enter the ZOLDR ACTIVATE command to activate the loadsets. Once the activate function is complete, the programs contained in the loadsets are available to the TPF system.

Falling Back to Previous Versions of Programs

If you load and activate programs using the E-type loader and those programs prove unacceptable, you can easily fall back to previous versions of the programs. Table 45 compares the differences between falling back to previous versions of programs in the TPF 3.1 system and the TPF 4.1 system.

Table 45. Falling Back to Previous Versions of Programs

TPF 3.1 System	TPF 4.1 System
Enter the ZOLDR FLKB command.	Enter the ZOLDR DEACTIVATE or ZOLDR EXCLUDE command.

Accepting New Versions of Programs

If you load and activate programs using the E-type loader and those programs prove acceptable, you can easily replace the previous versions of the programs with the new programs. Table 46 compares the differences between accepting new programs on the TPF 3.1 system and the TPF 4.1 system.

Table 46. Accepting New Versions of Programs

TPF 3.1 System	TPF 4.1 System
Enter the ZOLDR DLET command.	Enter the ZOLDR ACCEPT command.

Reissuing ZOLDR Commands Should the TPF System Malfunction

Table 47 compares the differences between reissuing ZOLDR commands if there is a TPF system malfunction.

Table 47. Reissuing ZOLDR Commands Should The TPF System Malfunction

TPF 3.1 System	TPF 4.1 System
Enter the ZOLDR REST command.	The TPF 4.1 system attempts to automatically recover. If it cannot automatically recover, enter the ZOLDR CLEAR command.

Modifying and Displaying Records, Data, Main Storage, and Programs

The format of the following commands changed, and a validation option was added to each command. This validation option allows you to verify the data that you want to modify.

Command	Description
ZACOR, ZDCOR	Modify and display core (main) storage
ZAFIL, ZDFIL	Modify and display data or program records
ZAPGM, ZDPGM	Modify and display programs
ZAREC, ZDREC	Modify and display fixed file records.

See *TPF Operations* for a complete description of these commands.

You can specify the same number of bytes of validation data as you can modify. If the validation data does not match, an error message is issued and no modification is done. Help options were also added.

With the ZAPGM command, you can modify a program starting at a specified program listing address for up to 16 bytes. You can also specify the version code of a real-time program to change and the name of the loadset that contains the real-time program.

With the ZDPGM command, you can display a program starting at a relative starting address for up to 4095 bytes. You can also specify the version code of a real-time program to display and the name of the loadset that contains the real-time program. A new *disassembler* option (INSTR for instruction) was added that specifies that the data should be displayed in disassembled format (assembly language) rather than in hexadecimal. If you specify a relative starting address that is not on a fullword boundary, the program adjusts that address to the next lower fullword boundary, except for the INSTR parameter, which will round the address to the next lower halfword address.

Maintaining Memory Patch Decks

The new ZPTCH command allows you to maintain and execute groups of main-storage modifying commands (including ZACOR, ZADCA, and ZAPGM). You can use the ZPTCH command to build a patch deck consisting of up to 50 alter core commands, and you can have up to 20 patch decks existing concurrently.

Modifying and Displaying CPU Loop and Create Macro Control Levels

You can use the new ZACLV and ZDCLV commands to modify and display the control levels for the CPU loop, the create macro control levels, and the input list.

You can enter the ZACLV command to update the value for the control levels for the CPU loop, the create macros, or the input lists. Otherwise, you need to run the system initialization program (SIP) and then load Keypoint A (CTKA).

See *TPF Operations* for a complete description of these commands.

Adding, Modifying, and Displaying Commands

You can use the new ZFMSG command to add a new command online, or change and display the operational characteristics of a command.

Turning System Trace Options On and Off

In the TPF 4.1 system, you can turn on and turn off system trace options, VEQR logging, and block-checking mode by using the new ZSTRC command.

All changes from the ZSTRC command take effect immediately, except for register trace. When you turn on and turn off register trace, you must enter the ZRIPL command for the change to take effect. See “System Log Trace Facility” on page 298 for a description of these traces and the keywords. See “Starting and Stopping Virtual-Equals-Real (VEQR) Mode” on page 298 for more information about VEQR logging. See “Block Checking Mode” on page 299 for more information about block-checking mode.

Activating and Deactivating the PIU Trace Facility

In the TPF 3.1 system, the path information unit (PIU) trace facility was always active for every Systems Network Architecture (SNA) resource. You used the ZNTRP command to start or stop writing the PIU trace table to the real-time tape, or to display the status of the PIU trace facility.

In the TPF 4.1 system, you use the ZNTRP command to activate and deactivate the PIU trace facility. You also use this command to specify which SNA resources you want to trace. See “Path Information Unit (PIU) Trace Facility” on page 301 for more information about the PIU trace facility.

Using the Program Event Recording (PER) Trace Facility

Use the new ZSPER command to alter and display program event recording (PER) options. Use the following parameters of the ZSPER command to activate, change, and display the status of the PER trace facility for an IBM Enterprise Systems Architecture (ESA) processor.

DISPLAY

Indicates whether the PER trace facility is currently active or inactive.

STORE

Activates the storage alteration event.

INSTRUCT

Activates the instruction fetching event.

BRANCH

Activates successful PER branching events. This parameter is valid only for ESA/390 processors.

END

Disables the PER trace facility.

See *TPF Operations* for more information about the ZSPER command.

Only one function of the PER trace facility can be active at a time. In addition, execution of the PER trace facility is stopped automatically when more than 10 PER interrupts are received within any 10 second interval.

Handling Channel and Machine Checks

This section discusses:

- Thresholds
- Service processor (SVP) damage, warning, and degradation
- System recovery messages
- Recovering from disabled wait state codes.

Thresholds

When the fault-rate threshold for channel failures is reached, the TPF system cycles down to 1052 state and requires a hard IPL to go above 1052 state again.

In the TPF 3.1 system, there were two fault-rate thresholds for processor errors, one for catastrophic processor failures and another for non-catastrophic processor failures. In the TPF 4.1 system, there is only a threshold for catastrophic processor failures. When the fault-rate threshold for catastrophic processor failures is reached, the TPF system requires a hard IPL before restarting, and issues a message recommending that the operator switch to the backup processing complex.

You can change the fault-rate threshold for both channel and processor failures. See “Changing the Fault-Rate Threshold” on page 235 for more information.

In the TPF 4.1 system, to minimize the impact to resources, the TPF system issues fewer operator messages detailing channel and processor failures. If you have operating procedures keyed to messages from the channel check and machine check handlers, you must adjust your procedures to take into account the revised set of messages.

Service Processor (SVP) Damage, Warning, and Degradation

If an SVP damage, warning, or degradation is reported in a non-catastrophic context, the TPF 4.1 system cycles down to 1052 state and requires a hard IPL to go above 1052 state again.

In a catastrophic context, the TPF 4.1 system requires a hard IPL before restarting and issues a message recommending that the operator switch to the backup processing complex.

System Recovery Messages

In the TPF 3.1 system, you could enable or disable system recovery messages using the RECORD and QUIET parameters for the ZCMKH command. In the TPF 4.1 system, the ZCMKH command is no longer supported. The TPF system runs with these messages disabled (QUIET).

Recovering from Disabled Wait State Codes

In the TPF 4.1 system, the operator must issue an IPL CLEAR to recover fully from a DEADxx disabled wait state. In such a disabled wait state, there may be a storage error that the machine check handler was unable to circumvent, in which case the page and segment tables must be rebuilt. The IPL CLEAR forces these tables to be rebuilt.

Operational Changes to IPLB

The following section discusses the operational changes to IPLB for the TPF 4.1 system.

Duplicate Volume Serial Numbers (VSNs)

Prior to this release, DASD modules with duplicate volume serial numbers caused various problems during IPL disk roll call. If the duplicates were BSS online modules, the IPL was ended. If the duplicates were on an multiple database function (MDBF) subsystem, the subsystem was ended. In the case of general files, the first device was mounted and subsequent duplicates were discarded.

IPLB was changed to present the operator with a list of duplicate volumes and allow the operator to choose the address of the device to be used for the current IPL.

Three new unsolicited messages are used for this function:

- IPLB0014W
- IPLB0015A
- IPLB0016I.

The first message lists the addresses of the duplicate VSNs. The second prompts the operator for the address of the device to be used or NONE if none of the duplicates are to be used, and the third verifies that the request was accepted.

See *Messages (System Error and Offline)* and *Messages (Online)* for more information about these messages.

Destructive Initial Program Load (IPL)

Note: Destructive initial program load (IPL) is also known as *bypass IPL*.

Before this release, the IPLB00047A message, which allows the selection of a destructive IPL, was only issued when CTKI indicated that the IPLing processor was not the first processor in the loosely coupled complex. In other words, the first processor was not given the option of a destructive or bypass IPL. That choice (through the IPLB0047A message) is now given on every hardware IPL of an online module from any processor in a loosely coupled complex, regardless of the status of CTKI. This allows cleanup of CTKI in the event of a CTKI lockout because of a hardware failure on another processor.

Modifications to Database Reorganization (DBR) Commands

The database reorganization (DBR) commands were changed in several ways.

Command	Description of the Change
ZDBRO, ZDBSO	<p>A processor, subsystem user, and I-stream combination can now be specified. This combination allows reorganization of records accessible from the <i>owning</i> processor, subsystem user, or I-stream, if defined.</p> <p>Multiple subsystem users can be specified together in the same command regardless of processor or I-stream.</p> <p>The number of fixed record types increased to 12 KB, and commands were changed to reflect this in the START, RESTART, BYPASS, RESET, and DISPLAY parameters.</p> <p>The bypass parameter (BP) in the INIT parameter is no longer supported. Its replacement is BYPASS=YES or BYPASS=NO. The default is BYPASS=NO. This provides clearer user control.</p>
ZDBRI, ZDBSI	<p>The number of fixed record types increased to 12 KB, and the RESTART option commands were changed to reflect this.</p>

See *TPF Operations* for more information about these commands.

Learning About the Changes in System Support Services

This chapter describes changes in system utilities, including:

- Real-time tape post processing
- Capture and Restore
- Database reorganization (DBR)
- Data collection and reduction.

The following list summarizes the changes you need to make to adapt to changed system support services in order to migrate to the TPF 4.1 system:

- Review the changes for running Capture on both single and multiple modules.
- Review the list of records that you must not restore by a file restore.
- Make sure you allocate enough frames for database reorganization (DBR).

System Support

Before this release, determining the source of a storage overlay error was difficult because the program that detected the error could be totally unrelated to the program that caused the error. Furthermore, certain TPF system services allowed an E-type program to do things that were difficult to detect. For example, the MONTC macro (get supervisor state), allowed an E-type program to change anything.

Before this release, E-type programs could hide main storage blocks, pass them to other ECBs, chain them to globals, and so on.

Beginning with this release, the TPF system provides improved program isolation and entry protection with two hardware facilities:

- Dynamic address translation (DAT) facility
- Low address protection.

The primary function of the DAT facility is to provide a virtual storage environment for the processing program. The DAT facility works through a set of tables that, in addition to defining the virtual-to-real storage mapping, can define the areas of storage an entry is allowed to address or modify. When used correctly, DAT hardware can detect programs that are storing into protected storage at the time the store is attempted. The TPF 4.1 system uses the DAT facility to provide each ECB with private areas that are now more difficult to be corrupted by other ECBs or by the TPF system when operating on behalf of other ECBs.

Low address protection is a hardware facility that protects the first 512 bytes of storage against alteration by a program regardless of the storage key used by the program. The TPF 4.1 system uses this facility to protect the first 512 bytes of each I-stream's page 0 against corruption by either application programs or the TPF system. Not even the TPF control program can modify low storage while low address protection is active. Low address protection guards the part of the system that is more likely to be modified by a storage corrupter, and has no performance impact.

The TPF 4.1 system also provides two other system support enhancements:

- Run-time authorization for certain system services
- Shared storage between ECBs.

The TPF 4.1 system provides run-time authorization for the following system services:

- Get common blocks
- Get supervisor state (the MONTC macro)
- Get key 0 (for example, CINFC WRITE)
- Other macros that require authorized use.

You can specify which of these privileges you want to grant to programs and add additional restrictions or privileges of your own when you allocate the programs. See “Allocating Programs, Transfer Vectors, and Pools” on page 217 and “Adding Your Own Authorization Bits” on page 223 for more information.

See *ESA/370 Principles of Operation* for more information about the storage protection key.

In the TPF 4.1 system, an ECB’s virtual memory has its own page and segment tables, which translate the address of the ECB and any allocated frames. If an ECB refers to an address that is not valid, the ECB receives a system error and exits.

A major difference between the TPF 3.1 system and the TPF 4.1 system is in the sharing of storage between ECBs. The program isolation provided by the TPF 4.1 system prohibits some of the storage sharing techniques used in previous releases. However, ECBs can still share storage.

All ECBs share a pool of working storage under 16 MB, called the common area. This area is carved into 4 KB frames called common blocks. These blocks are visible to all ECBs at the same EVM addresses. Application programs can use common blocks to pass data between ECBs, allowing existing application programs that do this to run with minimal updates. However, this is **not** the preferred mechanism because this is a limited resource.

Several new macros are used by the control program to manage working storage blocks.

Macro Name	Description
\$GCOMC and \$RCOMC	Get and release common blocks.
\$GIOBC and \$RIOBC	Get and release input/output blocks (IOBs), which are used only by DASD code.
\$GSWBC and \$RSWBC	Get and release SWBs, which replace non-DASD IOBs.
\$GETBC and \$RELBC	Get and release other types of storage blocks. The \$GETBC macro gets logical storage blocks while the \$RELBC macro releases logical storage blocks.
\$GMNBC and \$RMNBC	Get and release contiguous storage in the heap private area.

Finally, the TPF 4.1 system provides a block checking mode to flag certain coding errors, such as writing beyond the end of a block, passing blocks chained to other blocks, and using storage that has already been released. You can turn block checking mode on and off without an IPL by using the new ZSTRC command. Performance is degraded when block checking mode is running. See “Block Checking Mode” on page 299 for more information.

Real-Time Tape Post Processing

With dumps spanning multiple tape volumes, the JCL for any real-time tape post-processing jobs must be changed to support concatenated data sets. This JCL is shown in “Multiple-Volume Tape Dumps and Post Processing” on page 261.

Load Balancing for Capture and Restore

In the TPF 4.1 system, the Capture and Restore package is enhanced in the way that it distributes simultaneous captures. Rather than trying to calculate channel utilization, you specify the maximum number of captures allowed for each tape control unit and DASD and tape channel path on the new ZFCAP command.

DASDCH

Maximum number of captures for each channel path (CHPID) for DASD access

DASDCU

Maximum number of captures for each DASD control unit

TAPECH

Maximum number of captures for each channel path (CHPID) for tape access

TAPECU

Maximum number of captures for each tape control unit.

The tape update utility maintains two tables, the channel usage table and the device control unit usage table, which maintain the count of effective captures and restores taking place on the channel path or control unit.

See *TPF Database Reference* for more information about the Capture and Restore package.

Running Capture

Capture uses the tape devices you specify on the ZFCAP start Capture commands for capturing DASD devices. In the TPF 3.1 system, Capture kept track of which tape device was used last, and continued the Capture on the next device you specified. In the TPF 4.1 system, when Capture needs another tape device, it selects the first available tape device, regardless of which tape device it just used. This affects your operational procedures for running Capture on both single and multiple DASD modules.

Running Capture on Single Modules

In the TPF 4.1 system, when you are running Capture on a single DASD module that requires more than one tape, only two tape devices are used, regardless of how many devices you specify on the ZFCAP command. Capture will use the first device you specify, then the second device, then the first device again.

For example, in the TPF 3.1 system, if you wanted to start Capture on DASD module 047, and you wanted to use tape devices 580, 581 and 582, you would enter **ZFCAP MOD 047 580/581/582**.

Capture would have selected each of the three tape devices in the order in which they display in the message. In the TPF 4.1 system, however, Capture selects device 580, then 581, then switches back to 580. Device 582 does not participate in the Capture operation. Only two tape devices are used. To specify that the two devices you want to use are 580 and 581, the correct way to specify the device pair is by entering **ZFCAP MOD 047 580-581**.

In the TPF 4.1 system, there is no way to associate more than two tape devices with one DASD module.

Running Capture on Multiple Modules

When you run Capture on multiple modules, Capture again searches for the first available tape device. This has two different effects depending on whether your DASD modules can be captured on one tape or require multiple tapes.

If your DASD module capture fits on one tape, the tapes will be selected in the order you specify based on availability. For example, if you wanted to start Capture on all your modules on a list of tape devices in the TPF 3.1 system, you would have entered **ZFCAP ALL 580/581/582/....**

The first module would be captured on device 580, the next module on device 581, and so on. But in the TPF 4.1 system, depending on your tape configuration and procedures, Capture will use device 580, then 581, then; if 580 is available, it will use 580 next.

If your capture requires more than one tape per module, you can specify tape devices in pairs to ensure that each module is captured on the same two devices by entering **ZFCAP ALL 580-581/582-583/584-585/....** This way a pair of tape devices will be used to capture each module.

You need to integrate these changes with the new load balancing support to ensure that Capture runs with minimal impact to the system and that tape devices are selected properly.

Capture Load Balancing

The DASDCU, DASDCH, TAPECU, and TAPECH parameters are provided to balance the resource loads required by Capture. You can set all of these parameters, except DASDCU. See *TPF Operations* for more information about these parameters.

The techniques used for balancing capture loads require a configuration change for some IBM 3990 models:

- IBM 3990 Model 2 with the limited lock facility (LLF)
- IBM 3990 Model 3 with LLF running record buffer emulation.

The limited lock facility (LLF) static switch may cause even and odd addresses to be placed on different channels (for example, 4E0, 6E1, 4E2, 6E3, and so on). However, for proper operation of load balancing, all the device addresses of these control units must have the same channel address. This is not a concern for the IBM 3990 Model 3 running record cache.

Load balancing is directly related to site resource requirements and the degree of multipathing found within the configuration. The configuration is described during Input/Output Configuration Program (IOCP) Generation.

Tape Support

The TPF 4.1 system provides an automatic tape mounting facility that allows you to do the following without operator intervention:

- Mount alternate (ALT) tapes on write-enabled devices
- Convert ALT tapes to active tapes for tape macro processing

- Convert ALT tapes to standby tapes for tape switching. Automatically mounting ALT tapes improves tape switching during the dump process, allowing your installation to minimize the number of tape devices used by a multiple volume tape dump.

You determine which tapes can be mounted automatically on which devices by creating tape groups, assigning tape labels to tape groups, and assigning tape devices to tape groups.

When a device is enabled for automatic tape mounting, the TPF 4.1 system automatically mounts an ALT tape if a write-enabled cartridge with an elapsed expiration date is loaded into the device. When the TPF 4.1 system needs an active or standby tape, it searches for an eligible ALT tape and converts it.

The TPF 4.1 system has enhanced system availability by providing lost interrupt detection for tapes. When the TPF 4.1 system detects a lost interrupt, the system either reports a permanent error to the application program or performs a tape switch. When the TPF 4.1 system detects a stalled tape module queue with no pending interrupt, it reports a permanent error to the application program. The ZCTKA command allows you to set the stalled tape module queue time-out value. See “Modifying Storage Allocation Values Online” on page 262 for more information about the ZCTKA command.

Automatic Tape Mounting and Capture and Restore

Capture and Restore processing suspends automatic tape mounting on all tapes used for Capture and Restore (except for the exception recording and keypoint Capture and Restore) until its processing is complete. Automatic tape mounting resumes when processing is complete.

Restoring Components of TPF Images

Use a general file loader (ALDR) or auxiliary loader (TLDR) load to restore the following records. You cannot use a file restore to restore these records.

Record Name	Description
#CIMRx	Core Image Restart area components
#CTKX	Image pointer record
#IPLx	IPLA and IPLB
#KEYPT	Keypoint fixed file area
#KBA	Keypoint backup area
#KSAx	Keypoint staging area
#OLDx	E-type loader fixed file records
#PROGx	E-type loader program base
#PVRx	Program version records

In addition, the following records cannot be restored by using a file restore:

- Keypoint control record in #IBMM4 (ordinal 54, record ID CK)
- Image History Record (IHR) type in #IBMM4 (ordinal 76, record ID X'00F4').

Online File Recoup

Online file recoup is a package used to return (or recoup) file pool addresses that were lost because of software errors or unplanned system restarts. Online file recoup also verifies the system fixed records and the chains of records attached to them.

Online file recoup consists of 4 major phases (Phase 1, Phase 2, Phase 3, and Phase 4), an initialization phase, and several optional phases. See *TPF Operations* for more information about online file recoup and a description of each phase.

Enhancements to Online File Recoup (APAR PJ21224)

Online file recoup has been enhanced through APAR PJ21224. By applying this APAR to your TPF 4.1 system, you can:

- Improve Phase 1 and Phase 2 performance
- Prevent the most common instances of database corruption caused by human error.

Highlights

The following highlights some of the enhancements provided to online file recoup through APAR PJ21224. Online file recoup now provides for:

- The use of tape blocking and control unit buffering for the RPC and RCI tapes
- A revised restart checkpoint mechanism to prevent potential loss of data because of tape errors or IPLs during Phase 1
- A larger recoup logging block (4 K rather than 1 K), which reduces the amount of tape I/O required during Phase 1 and Phase 2
- Additional checks (in addition to offline program sequence checking for RCP tapes) to ensure that RCP tapes are complete (for example, the last tape is not omitted and the first tape is not missing) and are from the same online file recoup run
- Placement of a time stamp from Phase 1 on the RCP tapes and propagation of that time stamp back to all RPE tape pseudo-directories for checking during Phase 3. This enhancement ensures that the correct RPE tape is mounted.

Note: The same time stamp is placed on the RCI tape.

Time stamping of the RCP, RCI, and RPE records (in addition to sequence checking) prevents database corruption because of mishandling of tapes. You must be aware that the following can cause database corruption:

- Descriptor records defined incorrectly
- Use of the wrong general file.
- The recoup descriptor writer (BKDR) in pre-Phase 1 to return a non-zero error code for any warnings and errors.
- Fast buffered tape I/O for tape error handling. The *tape write immediate* operation has been removed.

Migration Considerations

When applying APAR PJ21224, keep the following migration considerations in mind:

- Old RCI and RCP tapes can no longer be used.
- Apply this APAR to all loosely coupled processors at the same time before running a loosely coupled chain chase. You can use the E-type loader without any downtime to apply this APAR because all changes made were to real-time segments.

- Enter the ZTLBL command for all processors and subsystem users to change the tape labels for the RCP and RCI tapes to blocked mode.
- A change to the RCI tape format to support 4 K input blocks also requires a change to the descriptor segment that describes the RCI tape item.

If IBM TPFDF 1.1.3 is installed, you must also apply APAR PN78979 for IBM TPFDF.

Returning from Recoup GROUP Macro Exit Code

If you run loosely coupled non-multiple database function (MDBF) systems with processor unique fixed file records as the anchors to long-term pools, and use the ENT= parameter of the GROUP macro to determine whether to process in this processor, you must use the following instruction to return from your exit code:

B 8(R6)

This instruction indicates that you want to process the descriptor. If you use BR R6 to return from your ENT= exit code, this is no longer supported in the TPF 4.1 system. Consistent with MDBF ENT= exit support, this return indicates that chain-chase processing will not take place for this particular GROUP (USE=BASE) macro.

Database Reorganization (DBR)

This section discusses database reorganization (DBR) and topics such as:

- Running the database reorganization system utility
- Capturing fixed file record types
- Capturing pool record types
- Eligibility for DBR input.

See *TPF Database Reference* for more information about DBR.

Running Database Reorganization (DBR)

In the TPF 3.1 system, database reorganization (DBR) used the CREDC macro to write output records to tape. Each CREDC macro was associated with one block.

Note: DBR output tapes that are created by the DBR function in the TPF 3.1 system **cannot** be used on a TPF 4.1 system. Likewise, DBR output tapes that are created by the DBR function in the TPF 4.1 system **cannot** be used on a TPF 3.1 system.

In the TPF 4.1 system, DBR uses ECBs, but the ECBs are associated with frames (in large numbers). Before you run DBR, you need to make sure that you have allocated enough frames or you will run out of main storage.

Every environment is different, and numbers may vary significantly, but a guideline might be to allocate 20 frames for an ECB. The number of ECBs defaults to 4 (on the ZDBRO command), so if you allocate (4 ECBs) × (20 frames) = 80 frames for DBR, that should be sufficient. Because you need frames for other activities as well, you should not allocate more than one-third of the frames in your system to DBR. You should allocate less than this if you run DBR on more than one subsystem or subsystem user simultaneously, or if there is more activity in your system. Also, you

should use the ZDBRO OECB *xx* command (where *xx* is the number of ECBs to be used for output) cautiously because increasing the number of ECBs increases the number of frames needed for DBR.

To Increase the Number of Frames Available to DBR

1. Enter the ZCTKA ALTER FRM- *n* command (where *n* is the total number of frames that you want available).
2. Re-IPL the TPF 4.1 system.

Capturing Fixed Record Types

When you use the ZDBSO and ZDBSI commands to capture the entire database, you now have individual control on processor and I-stream unique records.

There is a new option on the ZDBSO INIT command so that you can selectively specify a group of subsystem users (SSUs). This option initializes the database reorganization (DBR) control records on only the SSUs you specify. You can initialize the control record with record types to be captured for a given SSU, processor, or I-stream with the ZDBRO INIT command.

If you want to run DBR on all shared records, enter the ZDBRO INIT command from a single SSU, processor, or I-stream. If you have mostly shared records with a few unique ones, run DBR after entering the ZDBRO INIT command from a single SSU, processor or I-stream, then run DBR by entering the ZDBRO INIT command to capture all the unique records owned by the SSU, processor, or specified I-stream. If you have a lot of unique records, run DBR using the ZDBSO and ZDBSI commands.

In the TPF 4.1 system, the first pool record type is assigned to the next value after the last fixed record type. In the TPF 3.1 system, pools were assigned record types 512 through 520 on all systems. In the TPF 4.1 system, DBR was changed to handle the new pool record type values with little effect to you.

In the TPF 4.1 system, the number of record types that can be defined in the system was increased to 12 KB.

Eligibility for Database Reorganization (DBR) Input

In the TPF 3.1 system, all records captured by the DBR output phase were read in during the DBR input phase.

In the TPF 4.1 system, only those records whose record ID attribute table (RIAT) attributes are setup as RESTORE=YES on the RIAT macro are restored to the new system during the DBR input phase.

Data Collection and Reduction, and Performance Monitoring

The performance of the TPF 4.1 system must be monitored to organize system resources properly for peak operating efficiency. The TPF 4.1 system provides data collection and reduction programs to measure system performance. These programs provide operational data about activities such as:

- Milliseconds CPU busy per message
- DASD accesses per message
- Memory usage per message
- Program calls per message

- Message rate
- Message length.

With this information and the transaction history, you can determine how efficiently the TPF 4.1 system is running, where bottlenecks occur, and what changes can improve system performance.

The TPF 4.1 system is enhanced to provide statistical data about each ECB. To aid performance monitoring and capacity planning, this data includes:

- CPU time allocated to the ECB
- ECB database activity using FIND and FILE macros
- ECB storage block requirements.

The preceding data is available when the ECB exits through the EXI user exit.

In addition, intercept hooks were added for selective collection of statistics on Enter/Back, VFA, and SON macros. To better control the amount of data collected the DATA CO (SIP) macro now has a SKIP parameter that specifies the number of entries between samplings (the default is 99). The ZMEAS command no longer supports the T parameter.

The data collection and reduction programs were rewritten substantially. Consequently, any modification that you have made to these programs will require additional effort. In addition, data collection no longer references the JDCD tape. Rather, it now uses a real-time tape named RTC.

Data collection and reduction provides:

- Tools for use during the installation and post-cutover phase to tune the TPF 4.1 system to peak efficiency
- Ways to bring about regular monitoring of system performance
- Statistics for observing long-term trends to provide a base for predicting the growth and needs of the TPF 4.1 system.

The new blocks and structures for the TPF 4.1 system require a variety of changes in the reports:

- Physical blocks, frames, and heap frames held are tracked and virtual file access (VFA) data was reformatted.

The following counters are maintained for VFA:

- Total program finds from VFA
- Total data finds from VFA
- Total candidate finds requiring I/O
- Total delay file buffers written
- Total number of immediate files processed
- Total number of VFA candidate files processed
- Total number of noncandidate files processed.
- Program reports on various subsystem data were dropped
- The JDCD tape has been replaced by the RTC tape so corresponding JCL changes must be made.

The new data collection hooks allow a variety of macros and messages to be individually tracked. These include:

- BACKC/ENTDC/ENTNC/ENTRC macros
- Incoming messages, ROUTC macros, and SENDC macros
- SIPCC, SLMTC, and various SON macros
- Find/File macros for VFA and VFA fastpath.

Collection of this information allows a finer focus on the activities of an individual ECB. In addition new fields were added describing CPU and file usage for each ECB. The dispatch and end times are recorded, as are the number of finds and files, and the number of primary memory requests (GETFCs). A field allows a user-specified identifier to be associated with the ECB.

See the *TPF System Performance and Measurement Reference* for more information about data collection and performance monitoring.

Data Collection

Data collection can be run in continuous mode or sampling mode, allowing multiple types of data to be captured while avoiding significant interference with message processing. All data collection programs write the capture data to an online tape. No attempt is made to analyze the data online, as this would have a negative impact on the system that is being measured.

The three basic techniques used for collecting data are:

- Reading out counters that are embedded in and updated by the TPF 4.1 system
- Intercepting specific events, such as database macros and program entries when those collector programs are active
- Sampling parameters that fluctuate with time, such as I/O device queues and memory blocks in use.

Data Reduction

All data reduction is performed on an IBM Multiple Virtual Storage (IBM MVS) system. The data reduction reports are intended for use by an analyst familiar with the TPF 4.1 system. Frequency distribution reports including means, standard deviations, and variances of many parameters are available.

The aim of the initial analysis phase of a working system is to establish the normal limits for each of the key factors affecting performance. Once these limits are set and agreed to be realistic, a periodic system check becomes routine.

The analysis of performance data must always start with summary reports. These reports provide key data required for history and trend analysis. When investigating a problem area, the more detailed plot reports or the specialized reports of the DASD and message reduction programs are used. The plot reports, which show the value of each parameter sample in chronological order, are very effective for analyzing the cause-and-effect relationship between parameters.

Data Reduction Input Tape Changes

In the TPF 4.1 system, the input tape processed by data reduction changed significantly. The changes follow here.

Area of Change

Input Tape

Description of Change

Formally a general use tape called JCD, it is now a real-time tape called RTC.

BS Record	This record is no longer supported because the data was moved to the new MM record.
DB/DE Record	The storage commodity data was updated; the Frame/Heap usage histograms were added; the CRPA and extra PAT slots for E-type loader data were added; the size of virtual file access (VFA) was added; the ZSTRC settings were added.
DR Record	The resource vector table (RVT) information record was updated to contain the resource identifier (RID) since the RVT is no longer directly indexed by RID.
DU Record	Data collection no longer controls tape blocking, so this record is no longer supported.
FC Record	The program event recording (PER) device tape queue length was added.
FF Record	The size was increased to a 4K block and the entries are no longer sequential (unless the Skip factor is set to zero).
FM/FN Record	A time stamp and the program event recording (PER) device I/O response time was added.
FQ Record	The file queue record was updated to use fullword counters for the device queue length.
FV Record	A time stamp and the redefinition of the current counters.
IS/IR/IT Record	The DASD IPC records were deleted since DASD IPC is no longer supported.
MI/MO Record	This record is no longer supported because the data was moved to the new MM record.
MM Record	The new message intercept record contains entries that look like the old MI/MO/NI/NO/BS message intercept records.
MxX/MxR/MxT Record	The secondary ID of H was dropped since airlines line control (ALC) is no longer supported. The secondary ID of B was updated to contain only one bisynchronous station for each record. The secondary ID of L was updated to contain only one synchronous link control (SLC) link for each record.
NI/NO Record	This record is no longer supported because the data was moved to the new MM record.
NS/NR/NT	The SNA data record header was changed to use a fullword time stamp.
PS/PI/PT Record	This record is no longer supported because the data was moved to the new PP record.
PP Record	The old PS/PI/PT records were moved into the program intercept record. The program name is now included in the data. The origin of the data is the program allocation table (PAT) and the data is no longer sequential unless the Skip factor is set to zero.

PX Record	This record is no longer supported because the data is no longer available.
SS/SR/ST Record	The storage commodity data was updated. The IPTE and PTLB counts were added.
SU Record	The subsystem data record was updated to remove unused fields from the header.
TT Record	A new record was added to bracket the data collection period. The TT record contains the current control information that is used to run data collection.

Data Reduction Output Report Changes

The following tables show the changes to the output reports for data reduction, and detail the impact of data collection and reduction on each report in the TPF 4.1 system.

These output reports are:

- General Reduction Reports
- System Reduction Reports
- File Reduction Reports
- Program Reduction Reports
- Message Reduction Reports.

General Reduction Reports:

Table 48. General Reduction Report Changes

General Reduction Report	Changes
Data Collection and Reduction Environment Summary Report	This report is now named and the input tape name is now listed. The ZSTRC settings for the online system execution modes are listed and the online intercept Skip factor is listed.
Application Summary Report	A total line was added.
Pushbutton Application Summary Report	There are no changes.

System Reduction Reports:

Table 49. System Reduction Report Changes

System Reduction Report	Changes
System Section of the System Summary Report	The IPTE and PTLB counts were added.
I-Stream Section of the System Summary Report	There are no changes.
Core Pool Section of the System Summary Report	This report was converted to report on the physical block types that are defined in the TPF 4.1 system (for example, LIOCB, LECB, LSWB, LFRAME, and LCOMMON).
Shutdown Section of the System Summary Report	This report was converted to report shutdown conditions based on the physical block types defined in the TPF 4.1 system.

Table 49. System Reduction Report Changes (continued)

System Reduction Report	Changes								
Frame Usage Histogram Report	<p>This is a new report that produces a histogram of the frames held at ECB exit.</p> <table> <tr> <th>Area</th><th>Description</th></tr> <tr> <td>Purpose</td><td>Reports the number of frames held at ECB exit time in histogram format.</td></tr> <tr> <td>Value</td><td>Used to evaluate the frame usage of the ECB.</td></tr> <tr> <td>Option</td><td>The SYSTEM option generates this report.</td></tr> </table>	Area	Description	Purpose	Reports the number of frames held at ECB exit time in histogram format.	Value	Used to evaluate the frame usage of the ECB.	Option	The SYSTEM option generates this report.
Area	Description								
Purpose	Reports the number of frames held at ECB exit time in histogram format.								
Value	Used to evaluate the frame usage of the ECB.								
Option	The SYSTEM option generates this report.								
Heap Frame Usage Histogram Report	<p>This is a new report that produces a histogram of the Heap frames held at ECB exit.</p> <table> <tr> <th>Area</th><th>Description</th></tr> <tr> <td>Purpose</td><td>Reports the number of Heap frames held at ECB exit time in histogram format.</td></tr> <tr> <td>Value</td><td>Used to evaluate the the Heap (ECB private storage above 16 MB).</td></tr> <tr> <td>Option</td><td>The SYSTEM option generates this report.</td></tr> </table>	Area	Description	Purpose	Reports the number of Heap frames held at ECB exit time in histogram format.	Value	Used to evaluate the the Heap (ECB private storage above 16 MB).	Option	The SYSTEM option generates this report.
Area	Description								
Purpose	Reports the number of Heap frames held at ECB exit time in histogram format.								
Value	Used to evaluate the the Heap (ECB private storage above 16 MB).								
Option	The SYSTEM option generates this report.								
System Plot Reports	There are no changes.								
System Distribution Reports	There are no changes.								
Interprocessor Communication Summary Report	No longer supported. The data previously contained in this report is now found in the Interprocessor Communication MPIF Summary Report.								
System Pools Summary Report	There are no changes.								
MPIF Configuration Summary Report	There are no changes.								
Interprocessor Communication MPIF Summary Report	There are no changes.								
MPIF Path Activity Report	There are no changes.								

File Reduction Reports:

Table 50. File Reduction Report Changes

File Reduction Report	Changes								
Subsystem Summary Report	There are no changes.								
File Access Summary Report	The input/output (I/O) response times were added.								
VFA Summary Report	<p>In the TPF 4.1 system, the virtual file access (VFA) summary data was moved from the Random File Access Summary Report and reformatted to look like the ZVFAC IND command output. In addition, the VFA hit rate was added.</p> <table> <tr> <th>Area</th><th>Description</th></tr> <tr> <td>Purpose</td><td>Reports on VFA activity.</td></tr> <tr> <td>Value</td><td>Used to evaluate the VFA activity in the online system.</td></tr> <tr> <td>Option</td><td>The FILE option generates this report.</td></tr> </table>	Area	Description	Purpose	Reports on VFA activity.	Value	Used to evaluate the VFA activity in the online system.	Option	The FILE option generates this report.
Area	Description								
Purpose	Reports on VFA activity.								
Value	Used to evaluate the VFA activity in the online system.								
Option	The FILE option generates this report.								
Random File Access Summary Report	The virtual file access (VFA) summary data was moved to the new VFA Summary Report and the input/output (I/O) response time was added.								
File Plot Reports	There are no changes.								
File Distribution Reports	There are no changes.								

Table 50. File Reduction Report Changes (continued)

File Reduction Report	Changes
Channel Path ID Status Report	There are no changes.
Channel Path Activity Summary Report	There are no changes.
SDA Activity Summary Report	There are no changes.
Sequential File Access Summary Report	Change - The mean tape queue size will be added.
File Accesses Per Record ID Report	The virtual file access (VFA) fast path accesses were added as a column in this report when the device type is VFA.
File Accesses Per Cylinder Report	There are no changes.
File Comparison Plot Report	There are no changes.
3880 Cache Detail Report	There are no changes.
3990 Cache Detail Report	There are no changes.
3990 Cache Device Detail Report	There are no changes.
3990 Cache Summary Report	There are no changes.
3990 Device Summary Report	There are no changes.

Program Reduction Reports:

Table 51. Program Reduction Report Changes

Program Reduction Report	Changes
Program Names and Enters Report	There are no changes.
Program Details Report	The columns indicating the nesting level were deleted since that data is no longer available.
Cumulative Program Enters Report	There are no changes.
Cumulative Program On-File Enters Report	There are no changes.
Program-Category Statistics Report	There are no changes.
Package Details Report	The columns indicating the nesting level were deleted since that data is no longer available.
Cumulative Package Enters Report	There are no changes.
Cumulative Package On-File Enters Report	There are no changes.
Subsystem Details Report	This report is no longer supported. There is no replacement.
Cumulative Subsystem Enters Report	This report is no longer supported. There is no replacement.
Cumulative Subsystem On-File Enters Report	This report is no longer supported. There is no replacement.
Program Subsystem Counts Spread Report	This report is no longer supported. There is no replacement.
Program Subsystem Rates Spread Report	This report is no longer supported. There is no replacement.
Program Subsystem Percentages Spread Report	This report is no longer supported. There is no replacement.
Program Categories Report	References to <i>coreslow</i> and <i>corefast</i> were changed to <i>core resident</i> . Categories that no longer exist were removed.

Table 51. Program Reduction Report Changes (continued)

Program Reduction Report	Changes
Program Legend Report	References to the columns for nesting levels were removed.
Weighted Message Rate Report	There are no changes.

Message Reduction Reports:

Table 52. Message Reduction Report Changes

Message Reduction Report	Changes
Message Summary Report	There are no changes.
Action Code Summary Report	There are no changes.
Application Detail Report	There are no changes.
City Summary Report	There are no changes.
Terminal Activity Report	There are no changes.
Logical Unit Activity Report	There are no changes.
Message Stream Report	There are no changes.

Diagnosing Problems and Debugging

This chapter provides information about new problem determination tools, such as the trace facilities, that are available in the TPF 4.1 system. In addition, enhancements to existing problem determination tools (those tools provided with the TPF 3.1 system) are also discussed.

There are no changes that you must make in diagnosing problems and debugging to migrate to TPF 4.1 system, but there are several more new and improved tools available to you, including:

- Virtual-equals-real (VEQR) mode (for testing the migration)
- System traces including:
 - Enter/back trace facility
 - Macro trace facility
 - Register and S/370 branch trace facility
 - SNA I/O trace facility
 - System log trace facility.
- Block checking mode
- Real-time trace (RTT)
- Program event recording (PER) trace facility
- Path information unit (PIU) trace facility
- Systems Network Architecture (SNA) I/O trace facility.

Diagnostic Tools

Before this release, the TPF system did not support the register and S/370 branch trace facility. The only way to use the functions of the program event recording (PER) trace facility was to run the TPF system under the IBM Virtual Machine (VM) system. All macros for a single I-stream were traced in the same table. As one ECB gave up control and disappeared, new trace entries were added for the currently active ECB. This meant that high activity levels by one ECB could age out the trace entries created by other ECBs. For performance reasons, only file-resident ENTxC or BACKC calls were traced.

The SNA I/O trace facility had one table for the entire system. When a device error occurred, the information was frequently aged out by other high-use devices.

Beginning with this release, the TPF 4.1 system supports the following hardware facilities:

- Register and S/370 branch trace facility
- Selected functions from the program event recording (PER) trace facility.

The PER trace facility provides a hardware trace facility that traps a program event when a specific event occurs. In the TPF 4.1 system, you can use the PER trace facility to trap the following:

- Processing of a successful branch instruction on IBM ESA/390 systems
- Fetching of an instruction from a designated storage area
- Alteration of the contents of a designated storage area.

The new ZSPER command allows you to specify the events that you want to trap. See “Using the Program Event Recording (PER) Trace Facility” on page 272 for more information about the ZSPER command. See *ESA/370 Principles of Operation* for more information about PER.

Note: The performance cost of running some PER traces restricts them to test systems or off-peak periods.

The following enhancements were made to the diagnostic capabilities in the TPF 4.1 system:

- **Register and S/370 Branch Trace Facility**
Provides a list of the last 1000 processed BALR, BASR, and BASSM branches using either the IBM ESA/370 or IBM ESA/390 architecture. This trace facility maintains, with minimal performance cost, a list of the last 1000 BALR, BASR, and BASSM instruction branches. See *ESA/370 Principles of Operation* for more information about the register and S/370 branch trace facility.
- **Enter/Back Trace Facility**
Traces all ENTxC and BACKC macros.
- **I/O Trace Facility**
Has been improved to trace each device separately rather than as a single table for the entire system, allowing you to detect devices that are hung. The trace information is collated by time stamp.
See *TPF Main Supervisor Reference* for more information about the I/O trace facility.
- **Macro Trace Facility**
Provides the following traces:
 - A trace specific to an ECB
 - A collated trace, by time stamp, produced for all the ECBs on each I-stream.

Each ECB has its own unique trace area. The trace is maintained for each ECB rather than on a system-wide basis. More data is being saved for most traced events. There is also a collated trace for all ECBs on the I-stream, sorted by time stamp.

- **Online Mini Dump Trace Facility**
Enables you to activate a dump data user exit to present ECB-controlled SERRC and SNAPC data.
- **Path Information Unit (PIU) Trace Facility**
Provides expanded PIU tracing with additional information. See *TPF ACF/SNA Data Communications Reference* for more information about the PIU trace facility.
- **Program Event Recording (PER) Facility** provides a hardware trace to trap program information when a specific event occurs. The TPF 4.1 system supports the following PER facility functions:
 - Storage alteration
 - Instruction fetching
 - Successful branching (only on IBM ESA/390 processors).
- **Real-Time Trace (RTT) Facility**
Assists in determining the cause of errors by selectively monitoring the execution of ECB-controlled programs and producing a record of the system services macros processed and related data. See *TPF Program Development Support Reference* for more information about RTT.

- **Register Trace Facility**
Traces registers on every supervisor call instruction (SVC) and Enter/Back.
- **SNA I/O Trace Facility**
Provides a detailed I/O trace for SNA I/O interrupts that occur during Network Control Program (NCP) XID exchanges, adjacent link station (ALS) XID exchanges, and channel-to-channel (CTC) XID exchanges. The SNA I/O trace facility also provides a detailed I/O trace for NCP, ALS, and CTC asynchronous interrupts. See *TPF ACF/SNA Data Communications Reference* for more information about the SNA I/O trace facility.
- **System Log Trace Facility**
Traces events formerly included in the macro trace that are not associated with a message or an I/O device.

The new ZSTRC command activates all of these system traces. The output of the traces is included in system error dumps. The ZSTRC command also activates block checking mode and virtual-equals-real (VEQR) mode. See “Block Checking Mode” on page 299 for more information about block checking mode. See “Testing the Migration (Virtual-Equals-Real (VEQR) Mode)” on page 296 for more information about VEQR mode. See “System Log Trace Facility” on page 298 for more information about the parameters for the ZSTRC command.

The TPF 4.1 system provides the following improvements to the SNA communication trace facilities as well:

- The path information unit (PIU) trace facility can be activated and deactivated by entering the ZNTRP command. In addition, this command can be used to specify which resources to trace or to trace only the network control commands, virtual route (VR) pacing requests, and VR pacing responses for NCPs or CTCs. The ZNTRP command can also be used to specify whether or not to automatically write each 4 KB block to the real-time tape once the 4 KB block is full, and to specify the length of the request/response unit (RU) to store in the PIU trace table.

The PIU data stored in the PIU trace table now contains a time stamp, the procedure correlation identifier (PCID), and the origin and destination network identifier (NETID) and node name. Also stored in the PIU trace table is the 8-byte header included in all read and write channel programs during normal channel-to-channel (CTC) data transfer operations. The size of the PIU trace table is now defined by the TRACSZ parameter in the SNAKEY macro. See “Path Information Unit (PIU) Trace Facility” on page 301 for more information about the PIU trace facility.

Enhancements were also made to the offline PIUPRT utility that is used to print the PIU trace table once it was written to the real-time tape. Support for the NAME, PCID, and TIME input parameters was added. Use these input parameters to print the PIU data for a specific resource name, procedure correlation identifier (PCID) or time stamp. In addition, support for new PIUPRT formatting keywords has been added. Use COMPACT, FORMAT, or LONG to specify the format of the PIU trace table.

- Support for the SNA I/O trace facility was added to the TPF 4.1 system. This trace facility provides a detailed I/O trace for SNA I/O interrupts that occur during Network Control Program (NCP) XID exchanges, adjacent link station (ALS) XID exchanges, and CTC XID exchanges. It also provides a detailed I/O trace for NCP, ALS, and CTC asynchronous interrupts. Normal data transfer operations and attention-only interrupts that occur during NCP and ALS data transfer operations are not traced. See “Systems Network Architecture (SNA) I/O Trace Facility” on page 303 for more information about the SNA I/O trace facility.

The TPF 4.1 system no longer supports program test vehicle (PTV) phase I (unit test).

Virtual-Equals-Real (VEQR) Operating Mode

This release supports an operating mode for testing that provides limited virtual function to help you convert from a nonvirtual to a virtual TPF system. This operating mode is called virtual-equals-real (VEQR) mode.

In VEQR mode, ECB virtual memory (EVM) addresses are the same as system virtual memory (SVM) addresses. This means that addresses used are the same for all ECBs. Because ECBs must see storage under 16 MB, all working storage is carved under 16 MB.

VEQR mode allows you to run E-type programs that are unchanged from the TPF 3.1 system, even though the programs share data using techniques that are no longer supported. When unsupported storage sharing is discovered, the TPF 4.1 system logs the incident using the snapshot dump facility. This allows you to locate and correct code that will not function in a production TPF 4.1 system. In the meantime, VEQR mode allows the program to function. You can activate and deactivate VEQR logging (which notifies you where the problems are) with the new ZSTRC command.

VEQR mode provides the following functions:

- Illegal storage reference identification.
Because the TPF 4.1 system maintains page and segment tables for each ECB, if an ECB refers to a storage address in another ECB's private storage, the reference is flagged.
- Support for illegal storage references (page faults)
Without VEQR mode (EVM and SVM addresses do not match), when an ECB accesses an area not in its page and segment tables, the system cannot determine the address that the ECB wants to reference. In VEQR mode this can be determined because all addresses used by ECBs are the same for all ECBs. If an ECB refers to a storage address in another ECB's private storage, the TPF 4.1 system assumes that the ECB wanted to see that storage, and adds it to the second EVM. This allows you to run E-type programs that you have not modified for virtual storage techniques.

By using VEQR mode in a test environment, you can test individual programs as you make changes, before modifying your entire application program for the TPF 4.1 system. This allows you to migrate your application programs to the TPF 4.1 system gradually.

You can change a TPF 4.1 system to VEQR mode by issuing the ZSYSG command, and re-IPLing. See "Testing the Migration (Virtual-Equals-Real (VEQR) Mode)" for more information about VEQR mode.

Because VEQR mode has a substantial impact on performance and limits storage, it is not intended for production use.

Testing the Migration (Virtual-Equals-Real (VEQR) Mode)

The TPF 4.1 system provides a new operating mode, called virtual-equals-real (VEQR, pronounced V equals R) for testing. VEQR mode allows you to run your

unchanged TPF 3.1 E-type programs, and identifies places where you need to change programs to run properly in a virtual (TPF 4.1) environment (if you want this information).

In the TPF 3.1 system, there was only one view of main storage and all addresses were real. All ECBs and all storage blocks used by the system shared working storage, which meant that ECBs could corrupt storage that other ECBs were using.

In the TPF 4.1 system, each and every ECB has a different view of main storage. The layout of storage is the same for both the system virtual memory (SVM) and the ECB virtual memory (EVM) except in two areas:

- Working storage
- Heap private area of the EVM at the top of main storage.

See Figure 6 on page 215 for more information the virtual storage layout.

Each ECB has its own private areas that are not shared by other ECBs and, therefore, cannot be corrupted by other ECBs.

How Virtual-Equals-Real (VEQR) Mode Works

In virtual-equals-real (VEQR) mode, system virtual memory (SVM) addresses are the same as ECB virtual memory (EVM) addresses, so the SVM is identical to every EVM (except in the heap private area). In the TPF 3.1 system, 2 ECBs could share a storage block if one ECB created a second ECB and passed the address of the storage block to the second ECB. ECBs cannot do this in the TPF 4.1 system.

For example, imagine you have a program that creates an ECB and tries to pass an address to a second ECB. See Figure 11 on page 298 for more information about VEQR addressing.

In Figure 11 on page 298, the following occurs:

1. A request for an ECB results in the creation of the first ECB, ECB1, and the first ECB virtual memory, which is EVM1. The new ECB, which is ECB1, is now in both the SVM and EVM1 at the same address.
2. ECB1 requests data from a file (located in either virtual file access (VFA) or on DASD). The file service routine places the data into a 4 KB frame (labeled A in the figure) so that programs can access it. Data area A is now in both the SVM and EVM1 at the same address.
3. ECB1 creates another ECB, ECB2 (and another EVM, which is EVM2) and passes the address of data area A to this new ECB.
4. ECB2 attempts to access data area A but fails because, according to the page and segment tables for EVM2, this address is not valid. Data area A exists in EVM1 but not in EVM2, so ECB2 cannot access it. This type of data sharing, where two ECBs both use the same data area, is not supported in the TPF 4.1 system. The TPF 4.1 system, in VEQR mode, detects the error and takes a SNAPC dump to log the illegal storage reference.
5. Because every data area has a unique address that remains constant across all EVMs and the SVM in VEQR mode, the TPF 4.1 system corrects the page and segment tables for EVM2 using the page and segment tables for the SVM, allowing ECB2 to access data area A and continue processing. At this point, both ECBs have data area A in their own ECB area.

Note: This is not supported in normal TPF 4.1 mode, so the code that does the illegal storage referencing must be fixed before it will run successfully in a production (normal mode) TPF 4.1 system.

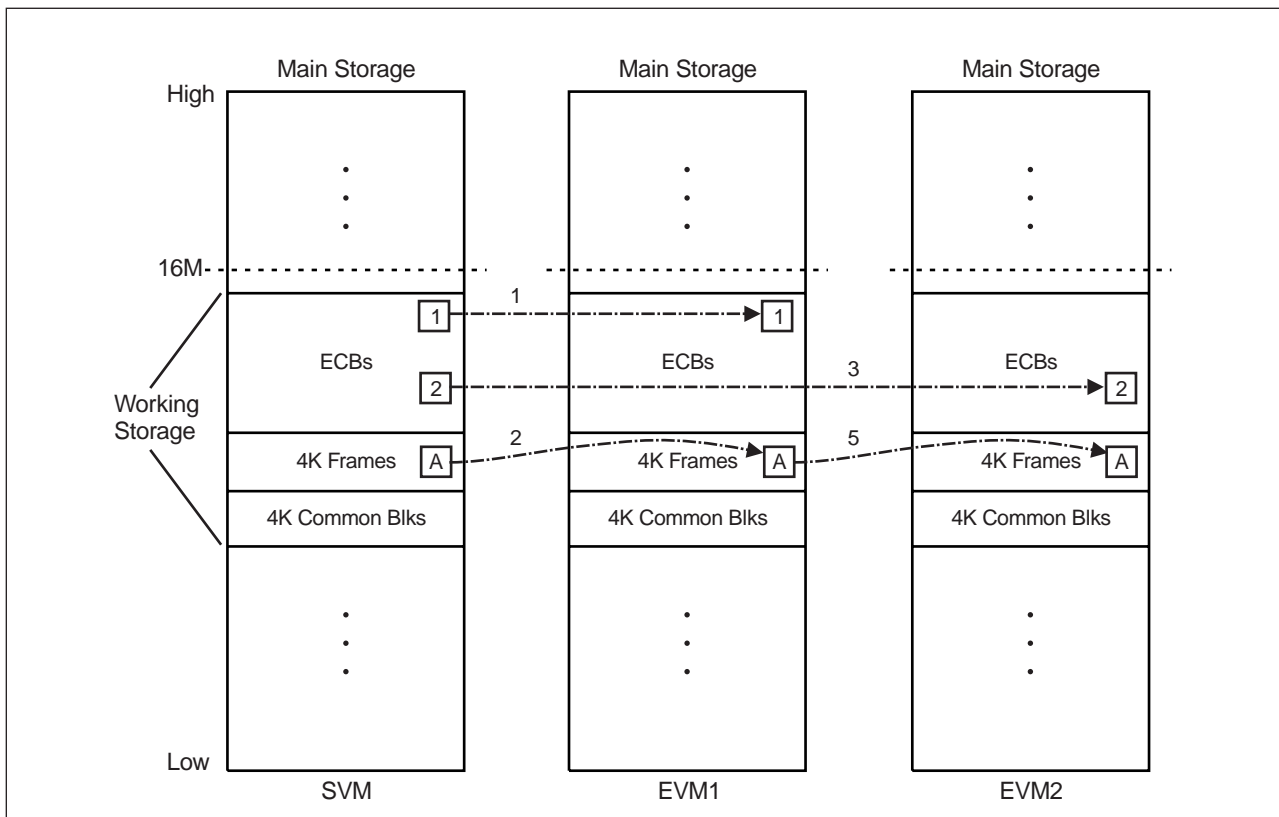


Figure 11. Virtual-Equals-Real (VEQR) Addressing Example

Starting and Stopping Virtual-Equals-Real (VEQR) Mode

If you want to run virtual-equals-real (VEQR) mode without being notified of the places where you need to change your programs to run properly in a virtual environment, you can turn off VEQR logging by using the ZSTRC command by entering **ZSTRC ALTER NOVRLOG**. VEQR will continue to correct bad page references without notifying you. To turn on VEQR logging again, enter **ZSTRC ALTER VRLOG**.

To Run in VEQR Mode

1. Enter the ZSYSG ALTER VEQR command.
2. Re-IPL the TPF 4.1 system.

To Stop in VEQR Mode

1. Enter the ZXYSG ALTER NOVEQR command.
2. Re-IPL the TPF 4.1 system.

System Log Trace Facility

Table 53 on page 299 compares the system traces that are supported in the TPF 3.1 system and the TPF 4.1 system. You can activate the TPF 4.1 traces by using the new ZSTRC command.

Table 53. System Log Trace Summary

Type of Trace	TPF 3.1 System	TPF 4.1 System	ZSTRC Keywords
Macro Trace Facility	Was a stand-alone trace, activated by modifying a keypoint or adding code to the macro decoder user exit. Only file resident Enter/Back macros were included in the trace.	Traces all SVC macros associated with an ECB. There are two tables in the dump: <ul style="list-style-type: none"> A dump of the ECB virtual memory, which includes all the macros (SVC calls) issued by the ECB. This is a wraparound trace; when it runs out of space, it writes over the oldest entries. A collated trace that contains all macros called by all ECBs on the I-stream, sorted by time stamp. 	Macro NOMacro
System Log Trace Facility	Included in the macro trace facility. This was on whenever the macro trace facility was on.	This is a subset of the macro trace and I/O trace facilities that you can turn on and turn off.	SYslog NOSYslog
Enter/Back Trace Facility	Included in the macro trace facility. This was on whenever the macro trace facility was on.	This is a subset of the macro trace facility that you can turn on and turn off.	Enter NOEnter
I/O Trace Facility	Was a stand-alone trace, handled by the common I/O routine or the common I/O handler. There was one table for the entire TPF system. This trace was always active.	The trace is maintained separately for each device. A collated trace appears at the beginning of the dump (similar to collated macro trace).	IO NOIO
Register Trace Facility	Not provided.	This new option traces register contents on every SVC call.	REGS NOREGS
Register and S/370 Branch Trace Facility	Not supported.	Provides a list of the last 1000 processed BALR, BASK, and BASSM branches using either the IBM ESA/370 or IBM ESA/390 architecture.	Branch NOBranch

Block Checking Mode

Block checking mode is a debugging tool that flags certain coding errors, such as writing beyond the end of a block, passing blocks chained to other blocks, and using storage that has already been released.

When block checking mode is turned on:

- ECBs run in single block mode. Single block mode dispenses a single block in each frame. The block is located in the last block slot available in the frame. Therefore, if a program overwrites the block, there is an increased chance of

receiving a page fault for going beyond the end of the frame. This is not foolproof, however. If the subsequent frame is valid in the ECB's address space, a page fault will not occur. Furthermore, L0 (127-byte) blocks are located in the same size block slot as used for L1 (384-byte) blocks, and overwriting these blocks will not result in a page fault until the end of the logical block is reached. Single block mode is automatically suspended for an individual ECB if the available storage for the ECB falls below 10 pages.

- Release block processing will disconnect a frame from an ECB if the block being released is the only block in the frame. Subsequent references to the block will result in a page fault because the address is no longer valid in the address space of the ECB.
- ECB exit processing interrogates each frame it disconnects from the ECB to look for lost blocks. If a block is flagged as *in use*, then the TPF 4.1 system issues a CTL-749 system error to indicate that a missing block was found.

You can turn on and turn off block checking mode by using the ZSTRC command without re-IPLing the TPF 4.1 system.

Note: You should use block checking mode with caution in a production system, because block checking mode degrades CPU performance and depletes working storage.

To Turn On Block Checking Mode

1. Issue the ZSTRC ALTER BLKCHK command by entering **ZSTRC ALTER BLKCHK**.

To Turn Off Block Checking Mode

1. Issue the ZSTRC ALTER NOBLKCHK command by entering **ZSTRC ALTER NOBLKCHK**.

Program Test Vehicle (PTV) Changes

The TPF 4.1 system does not support Program Test Vehicle (PTV) Phase I. If you are using PTV Phase I, all of the macros associated with this support are no longer supported. These macros include:

- LOMET
- SKIPT
- STPMT
- STPPT.

You should consider using other test tools.

In the TPF 4.1 system, the PTV control program, which is called APTV, was moved from CSECT to CCUTIL. In addition, PTV program loads in phase are not supported.

See *TPF Program Development Support Reference* for more information about PTV.

Using the Program Event Recording (PER) Trace Facility

This section discusses how to use the program event recording (PER) trace facility.

Running Virtual Machine (VM) Program Event Recording

If you are running VM instruction (PER) trace on 24-bit file-resident programs, you may experience addressing problems (the SVM address may not be the same as the EVM address, which you need for tracing). To run PER on these programs, you need to temporarily reallocate them as common.

To Temporarily Reallocate Programs as Common before Running PER

1. Before you reallocate the program, enter the ZDPAT *prog* (where *prog* is the program name) command to determine how the program is currently allocated.
2. To change the allocation to common, enter the ZAPAT *prog* CLASS-COMMON command.
3. Re-IPL the TPF 4.1 system so that the PAT is updated.
4. Run PER trace.
5. Change the allocation back to what it was before you ran PER (using the ZAPAT command again)
6. Re-IPL the TPF 4.1 system.

Running Program Event Recording (PER) in a Native TPF 4.1 System

You can run the program event recording (PER) trace facility in a native TPF 4.1 system. However, you should be careful when you use the PER trace facility on a production system because it can seriously affect system performance.

The following PER functions are supported for the TPF 4.1 system:

- Storage alteration
- Instruction fetching
- Successful branching (only on IBM ESA/390 processors).

Note: In a test environment under an IBM Virtual Machine (VM) system, use of the CP TRACE facility is recommended. The functions of the PER trace facility that are provided in the TPF 4.1 system is a subset of the ESA PER capability, and PER interrupts do not stop execution of the TPF 4.1 system. In addition, the CP Trace Facility is functionally more productive.

To Run PER in a Native TPF 4.1 System

1. Use the ZSPER command to activate, end, and display the status of the PER trace facility of IBM ESA processors.
2. Use the PER user exit to change the output destination and the amount of output or the format of output captured by a PER interrupt.

Path Information Unit (PIU) Trace Facility

The path information unit (PIU) trace facility provides a detailed trace of the data, or PIUs, transferred between a TPF 4.1 system and channel-to-channel (CTC), adjacent link station (ALS), and Network Control Program (NCP) resources. Each time the TPF 4.1 system sends or receives a PIU, the transmission header (TH), request/response header (RH), and some or all of the request/response unit (RU) associated with that PIU are stored in the PIU trace table when the PIU trace facility is active.

Note: Advanced Communications Function/Trace Analysis Program (ACF/TAP) is no longer supported in the TPF 4.1 system.

The following enhancements were made to the PIU trace facility for the TPF 4.1 system:

- The ability to activate or deactivate the PIU trace facility, and the ability to specify which resources were added to trace.

You can use the ZNTRP command to activate and deactivate the PIU trace facility, and to specify which resources to trace. For example, you can trace the PIUs being transferred between a TPF system and all SNA resources a subset of SNA resources, or a single SNA resource. You must first specify a resource name and you can further qualify with a network ID or the name of the NCP, ALS, or CTC that the resource is using. You can also trace only the network control commands, virtual route (VR) pacing requests, and VR pacing responses for NCPs or CTCs.

- The ability to define the size of the PIU trace table, as well as the length of the entries in the PIU trace table was added.

You can now define the size of the PIU trace table and the length of the entries stored in the PIU trace table. To define the size of the PIU trace table, use the TRACSZ parameter in the SNAKEY macro. To define the length of the entries in the PIU table, use the ZNTRP command.

- The following additional information is now stored in the PIU trace table:

- Time stamp
- Procedure correlation identifier (PCID)
- Origin and destination network identifier (NETID)
- 8-byte header included in all read and write channel programs.

- The ability to automatically write each 4 KB block to real-time tape was added.

You can use the ZNTRP command to automatically write each 4 KB block of the PIU trace table to the real-time tape once the 4 KB block is full. If the length of the queue to real-time tape exceeds 20, the PIU trace facility stops writing the PIU trace table to tape until the queue becomes smaller.

- The ability to specify the type of output for the PIU trace table.

You can use the ZNPIU command to view one of three formatted displays. The three displays are:

- Compact
- Format
- Long.

See *TPF Operations* for more information about the ZNPIU command and an example of these displays.

PIUPRT Utility

The PIUPRT utility runs on the IBM Multiple Virtual Storage (MVS) system and can be used to format and print all or some of the PIU trace table once it is written to real-time tape.

The following enhancements were made to the PIUPRT utility for the TPF 4.1 system:

- Three new input parameters were added.

You can specify which PIU data you want to print by passing the PIUPRT utility one of the PIUPRT input parameters using the JCL PARM= parameter. For example, you can pass the ALL input parameter to print all the PIU data contained on the real-time tape.

In the TPF 4.1 system the NAME, PCID, and TIME input parameters were added.

NAME

Print the PIU data that has a specific resource name.

PCID

Print the PIU data that has a specific procedure correlation identifier.

TIME

Print the PIU data that has a time stamp in a specified range of time.

- The ability to specify the format of the PIUPRT output was added.

You can also use the JCL PARM= parameter to pass the PIUPRT utility one of the PIUPRT formatting keywords. These keywords allow you to specify the format in which you want to print the PIU data. For example, you can pass the COMPACT keyword to print the PIU data in a compacted table format.

In the TPF 4.1 system the COMPACT, FORMAT, and LONG formatting keywords were added.

Keyword	Description
COMPACT	Print the PIU data into a compacted table format. Each entry in the PIU trace table is printed on a single line.
FORMAT	Print the PIU data into a formatted table. PIUPRT translates and prints the request header (RH) values and the entire response/request unit (RU) that is being traced.
LONG	Print the PIU data in long format. Some transmission header values are translated and printed, as well as the entire RU being traced.

See *TPF ACF/SNA Data Communications Reference* for more information about the PIUPRT utility.

Systems Network Architecture (SNA) I/O Trace Facility

The Systems Network Architecture (SNA) input/output (I/O) trace facility is a new SNA communication trace facility that provides a detailed I/O trace for SNA I/O interrupts that occur during:

- Network Control Program (NCP) XID exchanges
- Adjacent link station (ALS) XID exchanges
- Channel-to-channel (CTC) XID exchanges.

The SNA I/O trace facility also provides a detailed I/O trace for NCP, ALS, and CTC asynchronous interrupts. Normal data transfer operations and attention-only interrupts that occur during NCP and ALS data transfer operations are not traced.

When an I/O interrupt or an asynchronous interrupt occurs, the following data is stored in the SNA I/O trace table:

- Channel command word (CCW) index
- Condition code (CC)
- Channel status word (CSW)
- Commands associated with the first CCW for NCP and ALS XID exchanges, or the commands associated with the first 2 CCWs for CTC XID exchanges
- CTC status

- XID information field (I-field) contents.

The SNA I/O trace facility is initially active for each device defined in the symbolic device address table (SDAT). The SDAT is part of the SNA keypoint that is defined by the CK2SN data macro. The SNA I/O trace facility can be turned on or turned off for a device by modifying the SNA I/O trace indicator bit in the SDAT.

To display the contents of the SNA I/O trace table online, enter the ZDDCA command using the XID dump tag. The SNA I/O trace table is also included in system error dumps that have the control program keyword (ICP) specified in the dump override table. See “Controlling Dump Content” on page 237 for more information about dump keywords and the dump override table.

See the *TPF ACF/SNA Data Communications Reference* for more information about the SNA I/O trace facility.

Changing Application Programs for Migration

This chapter describes the changes you must make in your application programs to migrate to the TPF 4.1 system.

The following list summarizes the changes you need to make in your application programs in order to migrate to TPF 4.1 system.

- Carefully review all of the changes to E-type programs described in “Changes to E-Type Programs”.
- Use the GETCC macro to get private storage in the ECB private area (under 16 MB), and the MALOC and CALOC macros (or `malloc` and `calloc` IBM C language functions) to get private storage in the heap private area (above 16 MB).
- Modify your programs to share data between ECBs using common blocks, or the CRETC and CREEC macros, or by rewriting portions of your programs to allow sharing of data through find and file interfaces or with the EVENT facility or by passing global area addresses.
- Use the MOVEC macro to move data between address spaces. Decide authorization for the macros and code the CRESVC macros accordingly.
- Review changes to application utilities described beginning in “Changes to Application Utilities” on page 311.
- Use valid 31-bit values when passing addresses in 4-byte macro parameters. For example, if you are passing a 24-bit address, do not use the remaining byte to pass other data.
- Consider making some of the changes described in “Modifying Your Application Programs” on page 312.
- Review the information found in “Migration Considerations for Application Programs” on page 313. You may find these considerations helpful when migrating your application programs.

Note: The changes to the real-time (ECB-controlled) TPF environment are extensive.

See *TPF Application Programming* for more information about using application programs with the TPF 4.1 system.

Changes to E-Type Programs

All ECB-controlled (E-type) programs run in the ECB virtual memory (EVM), which consists of private and shared storage. There is private storage in two areas:

- The 1-MB ECB private area under 16 MB
- The 1-MB heap private area above 16 MB.

Private storage cannot be shared between ECBs. ECBs can share storage in common blocks and other areas of the EVM. Shared storage consists of common blocks and the remainder of the EVM that maps directly to the virtual memory of an I-stream (also known as system virtual memory (SVM)). See Figure 6 on page 215 for more information.

In the TPF 4.1 system, all programs are 4 KB in size. ECBs are now 12 KB and are comprised of three sections:

- The user portion, page 1, which is mapped by EB0EB

- The protected system portion, page 2, which is mapped by IEQCE2
- The unprotected system or trace portion, page 3, which is mapped by IEQCE3.

There are significant changes to the allocation of E-type programs, which are described in “Allocating Programs, Transfer Vectors, and Pools” on page 217. These changes include specifying 24- or 31-bit operating mode, authorization privileges, and residency. Any application programs that access the system tables, which have moved above the 16 MB, must be allocated to run in 31-bit mode. If you issue a MODEC macro to switch to 24-bit mode from one of these programs, you will get unpredictable results. All IBM C language programs must be allocated in 31-bit mode.

Other changes that you need to be aware of include:

- All E-type programs provided with the TPF 4.1 system are reentrant. Your E-type programs can remain non-reentrant or you can change them to reentrant programs.
- There are no corefast programs. Corefast and coreslow storage are no longer supported with the TPF 4.1 system.
- You cannot manipulate the program demand counter; use the GETPC and RELPC macros to lock or unlock programs in storage. Locking is discouraged.
- The first 24 bytes of the BEGIN macro header, which were stripped at load time in the TPF 3.1 system, are no longer supported. The 8-byte program header still exists, and consists of a 2-byte record ID of X'00FF', 2-byte program length, and 4-byte program name. Therefore, there is no longer a X'18' displacement between object code and listings. If you are subtracting this displacement in your application programs to calculate addresses, your code will be incorrect for reassembled programs.
- If you have programs that get the file address of a program record or a data record from either an ENTxC expansion or from the Enter/Back V-type constants (VCONs), this will no longer work. Use the GETPC macro with the FILE parameter to retrieve this information from the program allocation table (PAT).
- If you have code that gets address attributes directly from addresses, you should replace this code with SONIC calls.
- Application programs should not issue instructions that use real addresses, such as Set Storage Key Extended (SSKE). However, if you have applications programs that use real addresses, modify them to issue a Load Real Address (LRA) command prior to the command that uses the real address.

Note: This instruction requires supervisor state, which in turn requires authorization.

- If you have programs that issue a VM Diagnose, then you must change them to use real addresses for the Diagnose parameters. You should use the Load Real Address (LRA) instruction to obtain the real address.
- In the TPF 4.1 system, it is possible to modify some of the system generation bits online with the ZSYSG commnd. If you code a Conditional Branch (AIF) instruction to test the bit setting you will get the value at assembly time, which will be incorrect if the value was changed online by using the ZSYSG command. Use the SYSTC macro to get the current setting of the bit.
- You can no longer use the CROSC macro to get pools from another subsystem. You must change your database index (DBI) using the CEBIC macro, get a pool using the GETFC macro, and subsequently return to your DBI.
- Calls to certain critical TPF system services are implemented using the Monitor Call instruction, which generates a program check. The branch trace function

generates frequent program checks. Therefore, during application program development under VM, you can no longer use TR PROG, you must specify a range as in:

TR PROG 1-15

- The functions of the REHKA and UNHKA macros changed in the TPF 4.1 system. Therefore, you should consider researching the different uses of the REHKA and UNHKA macros before migrating your application programs because these types of functions (hook and unhook) are no longer supported in the TPF 4.1 system.

Despite all these changes, many application programs that do not share data and are reentrant can be used in the TPF 4.1 system without change.

The following sections describe:

- How to manage private and shared storage
- Which macros require authorization privileges
- Changes to application utilities.

Getting and Releasing Working Storage

With the TPF 4.1 system, there is a new limit on working storage. Even though the amount of working storage has increased substantially, the amount of private working storage available to a single ECB is limited to two 1-MB areas, and all ECBs share common storage.

There are two ways to get private storage:

- Use the GETCC macro to get storage in standard block sizes in the ECB private area (under 16 MB)
- Use the MALOC and CALOC macros (or the corresponding malloc and calloc IBM C Language functions) to get contiguous pieces of storage in the heap private area (above 16 MB). See “Getting and Releasing Heap Storage” for more information.

If an ECB tries to use more private storage than this at any given time, a dump will be issued and the ECB will exit.

The only solution to a single ECB trying to use more than the available amount of private storage is to somehow divide the single ECB into multiple ECBs. The 1-MB private area structures are an integral and architected part of the TPF 4.1 system.

If the ECB holds main storage blocks when it is exited, the TPF 4.1 system releases them. In the TPF 4.1 system, this is the most efficient way for the ECB to release this storage.

Getting and Releasing Heap Storage

In the TPF 4.1 system, you can get main storage in contiguous pieces of nonstandard sizes from heap storage. Use the assembler macros and the IBM C language functions found in Table 54 to manage heap storage.

Table 54. Assembler Macros and IBM C Language Functions to Manage Heap Storage

Assembler Macro	C Language Function	Purpose
MALOC	malloc	To get variable-sized, doubleword-aligned blocks

Table 54. Assembler Macros and IBM C Language Functions to Manage Heap Storage (continued)

Assembler Macro	C Language Function	Purpose
RALOC	realloc	To change the size of (or resize) an allocated block
FREEC	free	To return blocks allocated by the MALOC and RALOC macros, or malloc and realloc IBM C language functions
CALOC	calloc	To get variable-sized, doubleword-aligned blocks initialized to binary zeros.

See the *SAA Common Programming Interface C Reference - Level 2* for more information about the IBM C language functions.

Sharing Data between ECBs

Data in the ECB private area cannot be shared with, or accessed by, another ECB. To share data between ECBs, modify your application programs using one of the following methods:

- Use common blocks. First find the data to be shared. Then acquire a common block with the GETCC COMMON=YES macro. The application program moves the data to the common block and the original block is released. Once the data is in a common block, everything that worked in the TPF 3.1 system still works (such as unhooking blocks, hiding blocks, passing block addresses as CRETC parameters, and so on).

Two new parameters were added to the GETCC macro.

COMMON

Gets common storage (instead of storage from frames)

Note: The COMMON parameter is a restricted parameter that requires authorization.

FILL

Used to initialize the core block.

There are two disadvantages when using common blocks:

- They are shared among all ECBs so that any ECB can corrupt this storage
- There are a limited number of common blocks in the TPF 4.1 system.
- Use the CRETC macro. The new LEVEL parameter of the CRETC macro allows you to pass a block from the ECB issuing the CRETC macro and attach it to CBRW level 0 of the ECB being created. This works when you want to pass data from an ECB that already exists to a new ECB.

Note: The block itself is not actually moved. Instead, a copy is made of the data in a block that becomes part of the private area of the new ECB.

The disadvantage of using the CRETC macro for this purpose is that unlike common blocks, the two ECBs are not really sharing the same storage, so two-way communication does not exist between the ECBs.

- Use the CREEC macro. This works the same way in the TPF 4.1 system as it does in the TPF 3.1 system.

Like the CRETC macro, the disadvantage of using the CREEC macro for this purpose is that the two ECBs are not really sharing the same storage, so there is no two-way communication between the ECBs.

- Rewrite portions of the application program to allow sharing of data through find and file interfaces or through the EVENT facility. The data being passed is protected when not in use and will reside in the private area for a single ECB when in use.

The disadvantages of this method are that performance may suffer, and converting to use system services can require more than a simple modification to the existing code.

- Pass global area addresses. Global areas are common to all ECBs on the same I-stream. Global area addresses can be passed between these ECBs without translation problems. You can modify your application programs to use global areas instead of working storage blocks for some utility functions.

The disadvantage of using these global areas is that they are shared by all ECBs on the I-stream, any one of which can corrupt the storage.

Moving Data Between Address Spaces

Programming in the TPF 4.1 system requires address space awareness, which is knowing in which address space you are, and what storage you can access. Address space switching should be minimized because the associated performance overhead is substantial.

Use the new MOVEC macro to move data between the ECB virtual memory and system virtual memory address spaces. The MOVEC macro allows an E-type program to read or modify storage that is not part of its own address space. You can move data with the MOVEC macro in any combination of directions between address spaces. In other words, you can move data from ECB virtual memory (EVM) to EVM, from EVM to system virtual memory (SVM), from SVM to SVM, and from SVM to EVM.

Storage Manipulation Macros No Longer Supported

Table 55 summarizes macros that are no longer supported. Any code issuing these macros must be changed.

Table 55. Storage Manipulation Macros No Longer Supported for the TPF 4.1 System

Macro	Suggested Replacement
ATOLC	Use the ADDLC macro.
BLKBC	There is no replacement.
CLHCC	Use the SERRC macro or the SNAPC macro if the function is still needed.
CLHEC	Use the SERRC macro or the SNAPC macro if the function is still needed.
GETBC	Use the \$GETBC macro.
GIOBC	Use the \$GSWBC macro and the \$GIOBC macro.
GT MBC	Use heap storage or code multiple GETCC macros.
NTYPC	There is no replacement.
NXTBC	There is no replacement.
ORDBC	There is no replacement.
RELBC	Use the \$RELBC macro.

Table 55. Storage Manipulation Macros No Longer Supported for the TPF 4.1 System (continued)

Macro	Suggested Replacement
RIOBC	Use the \$RIOBC macro.
RLMBC	Let exit processing release storage.

Validating Block Addresses (VALBC)

There are significant changes to the VALBC macro for the TPF 4.1 system. In the TPF 3.1 system, when a block was previously accessed and then released, the VALBC macro returned a condition code of 1 (block not in use). In the TPF 4.1 system, the VALBC macro returns a condition code of either 1 or 2 (block not attached) because in some cases, the control program (CP) returned the frame.

Issuing Macros that Require Authorization

The TPF 4.1 system does run-time authorization checking on a select group of macros. E-type programs that start these macros must be authorized to do so. When E-type programs are allocated, you can specify which level of authorization an E-type program has on the OPTIONS parameter.

You can assign one or more of the following types of authorization:

- CMB specifies that the program can obtain common blocks (by issuing GETCC COMMON=YES).
- Key 0 authorization specifies that the E-type program is allowed to store into protected storage, for example, by issuing a CINFC W.
- The MONTC macro specifies that the E-type program is allowed to run in supervisor or monitor state, issue a MONTC to store into protected storage, and process privileged instructions until the program issues a LMONC.
- RESTRICTED specifies that the program is allowed to issue macros that are restricted for other reasons.

TPF System Macros provides information about the macros that require one or more of these authorizations. In most cases, the type of authorization associated with each of these macros is specified on the CKMAC parameter of the CRESVC call that defines the macro. CRESVC calls appear in IBMSVC or USRSVC. If you do not want this authorization checking to take place, you can turn it off by authorizing all programs (by altering CRESVC calls) that issue these macros.

Note: Although some macros may be general-use macros, they can contain parameters that are restricted. These restrictions **cannot** be turned off.

See *TPF System Macros* for more information about these macros and the type of authorization provided for a specific macro.

See “Allocating Programs, Transfer Vectors, and Pools” on page 217 for more information about allocating programs, and see “Defining SVCs” on page 231 for more information about defining SVCs.

Changes to Application Utilities

There are changes in the following areas:

- I-stream unique globals
- Location of global attribute indicators
- Block scanning or ECB checking
- Using input/output blocks (IOBs)
- Monitoring system activity
- Shutdown levels
- Querying the number of storage blocks.

Changes to I-Stream Unique Globals

In the TPF 3.1 system, because of the layout of main storage, an ECB on one I-stream could access the I-stream unique globals of another I-stream. This is no longer possible. If you have utilities that modify the unique globals in other I-streams, you must change these utilities to save the data, switch to the target I-stream, and update the target I-stream's globals using the saved data. This is because the addresses of global data unique to one I-stream are meaningless to another I-stream.

You can use the SWISC ENTER or SWISC CREATE macros to get from one I-stream to another. The SWISC CREATE macro creates a new ECB for processing on another I-stream. The SWISC ENTER macro simply switches the existing ECB to another I-stream without creating a new ECB.

To Use the SWISC ENTER Macro

1. Save the data in any available core block or in the ECB itself.
2. Issue the SWISC ENTER macro.
3. Copy the saved data to the new global field.

To Use the SWISC CREATE Macro

1. Save the data in any available core block.
2. Issue the SWISC CREATE macro to create a new ECB, and specify the level on which the core block is attached.
3. Issue EVNWC to wait for the other ECB to finish.
4. Write a second program that:
 - a. Receives the core block from the other ECB
 - b. Copies the data into the global area
 - c. Issues a POSTC to notify the first ECB that processing is complete
 - d. Issues EXITC.

The core block is attached to level 0 of the new ECB.

Testing Global Attribute Indicators

In the TPF 4.1 system, all global attribute indicators reside in the global attribute table (GAT). If you have application programs that test the global attribute indicators in the high order byte of a global directory entry, you must change them to use the IGATC macro to obtain the address of the GAT entry corresponding to the global.

Block Scanning or ECB Checking

You can scan blocks or check ECBs by moving data between address spaces with the MOVEC macro, or from the correct address space. 31-bit addresses are required. You can also use the GSVAC macro to get the address of a block attached to another ECB.

Using Input/Output Blocks (IOBs)

In the TPF 4.1 system, SWBs are used instead of input/output blocks (IOBs) as work blocks for the control program. To make this change in your programs, make the following changes:

- Use the \$GSWBC macro to get an SWB address rather than the GIOBC macro
- Use the \$RSWBC or \$RELBC macros to release SWBs rather than the RIOBC macro.

Monitoring System Activity

Monitors must be rewritten to track frames, common frames, ECBs, SWBs, and IOBs, rather than the blocks used in the TPF 3.1 system. Also, IOBs are no longer used as work blocks for the control program (CP), except for DASD code.

Shutdown Levels

Shutdown processing is now based on frames, ECBs, SWBs, and IOBs. Specify the values as a percentage of the total number allocated after any system-induced storage reductions have occurred. In general, you can set these values to shut down early, and then fine tune them based on TPF data collection reports.

Querying the Number of Storage Blocks

The MAXBC and NUMBC macros are based on these logical block types:

- I/O block (LIOB)
- Entry control block (LECB)
- System work block (LSWB)
- Shared working storage (LCOMMON)
- ECB-unique working storage (LFRAME).

Registers specified on the TYPE parameter must contain these logical storage block types.

Modifying Your Application Programs

There are several changes that you can make in your application programs (and should incorporate in new programs) that are not actually required to migrate to the TPF 4.1 system, but become more advantageous with this release. These include:

- Write programs in 31-bit mode whenever possible.
- Code the GETFC macro rather than GETSC or GETLC macros. The GETFC macro provides record ID attribute table processing, rather than the allocator, including enhancements made for the TPF 4.1 system.
- Code reentrant programs.
- Use SNAPC dumps rather than SERRC where feasible.
- If you are migrating TPF 3.1 segments over to the TPF system, you must do one of the following:
 - Allocate the TPF 3.1 segment as a 24-bit mode segment

- Reassemble the segment.

TPF 3.1 segments cannot be loaded onto a TPF system and run in 31-bit mode with a reassembly first.

- Use the input device support routine in your application programs to access input devices. This routine allows your application programs to operate independently of a device type.

Migration Considerations for Application Programs

Before migrating your application programs, you may want to review the following migration considerations.

Macro Considerations

Review the following macro considerations when migrating your application programs:

- Register Usage:
The content of register 14 (R14) and register 15 (R15) are unknown after an SVC call. The content of R14 and R15 are unknown after many macro calls.
- WTOPC:
 - An existing CRASC macro should be replaced with the WTOPC macro. The WTOPC macro is more efficient in the TPF 4.1 system.
 - Consider conversion of lengthy displays to use the PAGE= parameter on the WTOPC macro rather than hard-to-tune delay loops.
 - Look for potential message line *spill* due to changes in the length of the SMPA prefix.
- Reassemblies are needed for application programs that issue the SIPCC macro for coexistence due to the enter by program name and size change.
- All utilities that use general data sets (GDS) must code the GDS=YES parameter on the FIND and FILE macros.
- All application segments that obtain the file address of a program used as a data record from an ENTxC expansion must be modified to use the GETPC macro.
- Application programs that manipulate the program demand counter should be modified to use the GETPC and RELPC macros.
- Evaluate the use of the MODEEC calls and eliminate them where possible. The addressing mode can now be controlled in the program allocation table (PAT).
- Convert the GETLC/SC usage to the GETFC macro.
- Consider whether it would be advantageous to use the FILL= parameter on the GETCC macro for initialization.

Reentrancy Considerations

When migrating your application programs, you need to consider that application programs cannot issue an OC instruction to check a constant in a program. Rather, CLI should be used.

Program Nesting Levels

Application programs that reference the program nesting levels to determine how the executing program was entered need to be changed for the following reasons:

- The program nesting levels are now on page 3 of the ECB. Therefore, the program nesting levels are inaccessible to the application program without coding changes.

- There was a change in chaining. The backward chain pointer of the first nesting level used to be zero (O). It now contains the address of the ECB field CE1FPNL, which is a pointer to the first nesting level.

Data Sharing Considerations

Consider the following data sharing considerations when migrating your application programs:

- All segments that do any of the following are suspect and must be examined to determine whether they need to be modified:
 - Use the UNHKA and REHKA macros
 - Manipulate the block type fields
 - Create other ECBs.
- Issuing an ENTNC macro to FMSG programs with register 1 (R1) pointing to a message within an application program results in a CTL-4 in the FMSG program since the previous program was released.
- Core block addresses cannot be passed from ECB to ECB.
- Within an application program, you cannot do multi-buffering tape writes by using a core block to store short records and then write the block to a general tape. The core block is not shareable.
- All application segments that address and modify core blocks associated with another ECB need to be modified.

31-Bit Addressing Considerations

When migrating your application programs you need to consider that with 31-bit addressing, application programs can no longer use the top order byte of a register or an address to store data.

File Address Reference Formats (FARF) Considerations

Consider the following file address reference format (FARF) considerations when migrating your application programs:

- A rewrite of the record loader hash routines is necessary to take a FARF4 address and reduce it to a 6-byte address in a coexistent environment of FARF3 and FARF4.
- FARF4 addresses no longer contain address attributes. All other address attributes contained in the format of FARF3 address need to be obtained through the SONIC macro.

See “Expanded File Addressing Capacity and File Address Reference Format” on page 241 for more information about the FARF changes for the TPF 4.1 system and how to migrate your file addresses.

Miscellaneous Considerations

Consider the following miscellaneous considerations when migrating your application programs:

- Any application segments that use floating point registers to check for binary zeros need to be modified because of the C language use of floating point registers.
- Beware of changes in some ECB labels and lengths.
- Be especially careful of SSM usage. If you are not careful when doing this, unpredictable results may occur to your virtual addressing.
- Branch tables based on the 24-byte E-type header need to be adjusted.

Learning about the TPF 4.1 Library

Table 56 summarizes the following types of changes that were made in the TPF 4.1 library:

- Changing publication titles from those found in the TPF 3.1 library
- Merging information from multiple publications into one publication
- Dividing information from one publication into two publications
- Identifying publications that are no longer supported in the TPF 4.1 library.

See the *TPF Library Guide* for more information about the TPF 4.1 library.

Table 56. Summary of Changes Made in the TPF 4.1 Library

Publication Name in TPF 3.1 Library	Description of Changes in the TPF 4.1 Library
<i>ACF/SNA Data Communications Program Logic Manual</i>	This publication is now called <i>TPF ACF/SNA Data Communications Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>ACF/SNA Data Communications Program Reference Manual</i>	This publication is now called <i>TPF ACF/SNA Data Communications Reference</i> .
<i>ACF/SNA Network Generation Guide</i>	This publication is now called <i>TPF ACF/SNA Network Generation</i> .
<i>Application Programming Guide</i>	This publication is now called <i>TPF Application Programming</i> and contains information found previously in <i>Application Programming Guide for IBM C/370 Language Support</i> .
<i>Application Programming Guide for IBM C/370 Language Support</i>	This publication is no longer part of the TPF 4.1 library. The information that was found in this publication was merged into <i>TPF Application Programming</i> .
<i>Application Requester Diagnosis Reference</i>	This publication is now called <i>TPF Application Requester Diagnosis</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Application Requester User's Guide</i>	There are no changes to this publication.
<i>Concepts and Structure Manual</i>	This publication is now called <i>TPF Concepts and Structures</i> .
<i>Data Base Control Program Logic Manual</i>	This publication is no longer part of the TPF 4.1 library. The information that was found in this publication was merged into a new publication that is called <i>TPF Database Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Data Base Control Program Logic Manual High Performance Option Supplement</i>	This publication is now called <i>TPF Database Logic (HPO Supplement)</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Data Base Control Program Reference Manual</i>	This publication is no longer part of the TPF 4.1 library. The information that was found in this publication was merged into a new publication that is called <i>TPF Database Reference</i> .
<i>Data Base Support Program Logic Manual</i>	This publication is no longer part of the TPF 4.1 library. The information that was found in this publication was merged into a new publication that is called <i>TPF Database Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Data Base Support Program Reference Manual</i>	This publication is no longer part of the TPF 4.1 library. The information that was found in this publication was merged into a new publication that is called <i>TPF Database Reference</i> .
<i>Data Communications Services Program Logic Manual</i>	This publication is now called <i>TPF Data Communications Services Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Data Communications Services Program Reference Manual</i>	This publication is now called <i>TPF Data Communications Services Reference</i> .
<i>Data Manual</i>	This publication is now called <i>TPF Data Areas</i> . This publication is no longer supported as of program update tape (PUT) 12.

Table 56. Summary of Changes Made in the TPF 4.1 Library (continued)

Publication Name in TPF 3.1 Library	Description of Changes in the TPF 4.1 Library
<i>Documentation Aids Manual</i>	This publication is now called the <i>TPF Library Guide</i> .
<i>General Information Manual</i>	This publication is now called <i>TPF General Information</i> .
<i>IBM C/370 Language Support Diagnosis Reference</i>	This publication is now called <i>TPF C Language Support Diagnosis</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>IBM Transaction Processing Facility IBM C/370 Language Support Reference Summary</i>	This publication is no longer part of the TPF 4.1 library. The information that was found in this publication is also found in <i>TPF C/C++ Language Support User's Guide</i> .
<i>IBM C/370 Language Support User's Guide</i>	This publication is now called the <i>TPF C/C++ Language Support User's Guide</i> . This publication was previously called <i>TPF C Language Support User's Guide</i> .
<i>IBM Transaction Processing Facility Licensed Program Specifications</i>	There are no changes to this publication.
<i>Macro Manual</i>	This publication is now divided into two publications called: <ul style="list-style-type: none"> • <i>TPF System Macros</i> • <i>TPF General Macros</i>.
<i>Main Supervisor Program Logic Manual</i>	This publication is now called <i>TPF Main Supervisor Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Main Supervisor Program Logic Manual for the High Performance Option</i>	This publication is now called <i>TPF Main Supervisor Logic (HPO Feature)</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Main Supervisor Program Reference Manual</i>	This publication is now called <i>TPF Main Supervisor Reference</i> .
<i>Magnetic Tape Support Program Logic Manual</i>	This publication is now called <i>TPF Tape Support Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Messages and Codes Manual</i>	This publication is now called <i>Messages (System Error and Offline)</i> and <i>Messages (Online)</i> .
<i>Multi-Processor Interconnect Facility Program Logic Manual</i>	This publication is now called <i>TPF Multi-Processor Interconnect Facility Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Multi-Processor Interconnect Facility Program Reference Manual</i>	This publication is now called <i>TPF Multi-Processor Interconnect Facility Reference</i> .
<i>Non-SNA Data Communications Program Logic Manual</i>	This publication is now called <i>TPF Non-SNA Data Communications Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Non-SNA Data Communications Program Reference Manual</i>	This publication is now called <i>TPF Non-SNA Data Communications Reference</i> .
<i>Operations Guide</i>	This publication is now called <i>TPF Operations</i> .
<i>Program Development Support Program Logic Manual</i>	This publication is now called <i>TPF Program Development Support Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>Program Development Support Program Reference Manual</i>	This publication is now called <i>TPF Program Development Support Reference</i> .
<i>Programming Standards Manual</i>	This publication is now called <i>TPF Programming Standards</i> .
<i>Soft Copy Publications User's Guide</i>	This publication is no longer part of the TPF 4.1 library.
<i>System Generation Guide</i>	This publication is now called <i>TPF System Generation</i> .
<i>System Installation Support Program Logic Manual</i>	This publication is now called <i>TPF System Installation Support Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>System Installation Support Program Reference Manual</i>	This publication is now called <i>TPF System Installation Support Reference</i> .

Table 56. Summary of Changes Made in the TPF 4.1 Library (continued)

Publication Name in TPF 3.1 Library	Description of Changes in the TPF 4.1 Library
<i>System Performance and Measurement Program Logic Manual</i>	This publication is now called <i>TPF System Performance and Measurement Logic</i> . This publication is no longer supported as of program update tape (PUT) 12.
<i>System Performance and Measurement Program Reference Manual</i>	This publication is now called <i>TPF System Performance and Measurement Reference</i> .
<i>TPF 3.1 Migration Notebook</i>	This publication is now called the <i>TPF Migration Guide: Program Update Tapes</i> .
Not Applicable	<i>TPF Transmission Control Protocol/Internet Protocol</i> (also referred to as <i>TPF Transmission Control Protocol/Internet Protocol</i>) is a new publication for the TPF 4.1 library.
Not Applicable	<i>TPFDF and TPF Structured Programming Macros</i> (also referred to as <i>TPFDF and TPF Structured Programming Macros</i>) is a new publication for the TPF 4.1 library.

Appendix. Migrating System Error Calls (SERRC)

The following guidelines are intended to assist you in migrating the system error calls (SERRC) defined in the TPF 4.1 system.

System Error Calls (SERRC) Migration Considerations

1. Scan the TPF 4.1 system for all occurrences of the system error call (SERRC) number. Then, check the type of error found to determine whether it is a SERRC or a SNAPC dump and ensure that the appended messages (if any are used) are accurate and complete.
2. Determine whether the SERRC can be converted to a SNAPC dump. If there is any chance that a dump of memory could aid with diagnosis, then it must remain a SERRC.
3. Convert the old format SERRC (positional parameters) to the new format SERRC (keyword parameters).

Note: The conversion to the new format is optional and need only be done when there is other activity in the segment.

4. Analyze the occurrences to determine whether the SERRC number is a SYSDUMP=YES dump (the old CP parameter) or a SYSDUMP=NO dump (the old OPR parameter).

If the SERRC is a SYSDUMP=NO dump, then:

- The OPR dump will contain the same data found in the previous release.
- If additional data is needed, then use the LISTC macro to add additional data.
- When ZASER LONG is set, then the system error checks for an IDOTB entry. This is not recommended because you may need to debug using the SHORT version.
- If the system tables that are not found in the dump are necessary, it may be necessary to convert this to a SYSDUMP=YES dump.

If the SERRC is a SYSDUMP=YES dump, then:

- See “List of Areas” for a list of areas that are **not** dumped. It is recommended that you use this list and range options for IDOTB calls to reduce the number of IDOTB calls.
- If you need one or more of these listed areas, then code an IDOTB IDOTB call in the CIDP or the CVDP segment for user dumps to include that area. There is no need to add areas to IDATB; if it is not there, it is always dumped.

List of Areas

The following is a list of areas that are not included on a SYSDUMP=YES dump.

Area	Description
ICRPGM	24-Bit Core Resident Program Area
ICRH	31-Bit Core Resident Program Area
IISG1	IS-Shared Global Area 1
IISG2	IS-Shared Global Area 2
IISG3	IS-Shared Global Area 3

IISG4	IS-Shared Global Area 4												
IIUG1	IS-Unique Global Area 1												
IIUG2	IS-Unique Global Area 2												
IIUG3	IS-Unique Global Area 3												
IIUG4	IS-Unique Global Area 4												
IGAT	Global Attribute Table												
ICP	Control Program, except for the following:												
	<table> <tr> <th>Area</th><th>Description</th></tr> <tr> <td>ICAPT</td><td>Low Memory-CAPT</td></tr> <tr> <td>ICNFTBL</td><td>BSS CINFC Table</td></tr> <tr> <td>ICPSE</td><td>CPSE Internal Entry Trace</td></tr> <tr> <td>ISMDT</td><td>Selective Memory Dump Table (SMDT)</td></tr> <tr> <td>ICPLKMP</td><td>CP Linkage Map</td></tr> </table>	Area	Description	ICAPT	Low Memory-CAPT	ICNFTBL	BSS CINFC Table	ICPSE	CPSE Internal Entry Trace	ISMDT	Selective Memory Dump Table (SMDT)	ICPLKMP	CP Linkage Map
Area	Description												
ICAPT	Low Memory-CAPT												
ICNFTBL	BSS CINFC Table												
ICPSE	CPSE Internal Entry Trace												
ISMDT	Selective Memory Dump Table (SMDT)												
ICPLKMP	CP Linkage Map												
IMFST	Module File Status Table												
IRCSH	RCS Subsystem Status Table header												
IRCSB	RCS Subsystem Status Table Base												
IRCSO	RCS Subsystem Status Table Overflow												
IAET	RCS Asynchronous Event Table												
ICOMMON	4K Common Blocks												
IECBS	Entry Control Blocks (ECBs)												
ISWBS	System Work Blocks (SWBs)												
IIOBS	I/O Control Blocks												
ICLH	CLH Block Management Tables, except for the following:												
	<table> <tr> <th>Area</th><th>Description</th></tr> <tr> <td>IDCLS</td><td>CLH Dispatch Control Lists</td></tr> </table>	Area	Description	IDCLS	CLH Dispatch Control Lists								
Area	Description												
IDCLS	CLH Dispatch Control Lists												
IEVMDAT	EVM Page and Segment Tables												
IVFA1	VFA RSHT Area												
IVFA2	VFA RSTBCA Area												
IVFABUF	VFA Buffers												
IGLBLI	High Storage Primary Globals												
IXGLB1	Extended Global Area 1												
IXGLB2	Extended Global Area 2												
IXGLB3	Extended Global Area 3												
IXGLB4	Extended Global Area 4												
ISVDMAT	SVM Page and Segment Tables												
IMPIF	MPIF Control Tables												
IPOOL	Pool Directories												

ISNA	SNA Tables
ITAR	TPF Application Requester (TPFAR) Tables
IWGTA	WGTA Tables
IFACE	FACE Table
IRIAT	Record ID Attribute Table
IPAT	Program Allocation Table (PAT)
IPATHSH	PAT Hash Table
IPATIST	IS-Unique PAT Entries
IPATXTP	E-Type Loader Extra PAT Entries
ICIOLIT	CIO Lost Interrupt Tables
ICIOLDV	CIO LDEVBS
ICIOLMP	CIO Logical Device Map

Index

Special Characters

- >32K program
 - overview 18
- #OLDRx records
 - allocate 207
- #PVR records
 - define record types 207
 - program version record 207
 - use by
 - auxiliary loader (TLDR) 207
 - E-type loader (OLDR) 207
 - general file loader (ALDR) 207
- calloc function
 - get contiguous pieces of storage 307
 - manage heap storage 307
- free function
 - manage heap storage 307
- malloc function
 - get contiguous pieces of storage 307
 - manage heap storage 307
- realloc function
 - manage heap storage 307

Numerics

- 1052 state
 - cycle all processors 251
- 16-MB constraint relief
 - 31-bit addressing 213
 - changes 212
 - data integrity 213
 - description 22
 - heap storage 13
 - main storage increases 213
 - transaction protection 213
 - use by application programs 213
 - working storage 22
- 3-byte resource identifier (RID)
 - overview 22
- 31-bit addressing
 - 16-MB constraint relief 213
 - application program considerations 314
 - changes 213
- 3270 line support
 - alter CCP restart/shutdown polling controls 72
 - local lines
 - display status 72
 - start 74
 - stop 74
 - use 259
- 3600 multithread
 - message recovery changes 252
- 3705 control unit
 - dump
 - changes 84
 - purge from online system 84

- 3705 control unit (*continued*)
 - indicator
 - reinitialize 84
 - IPL 84
 - module
 - load to online system 84
 - scratch references 84
 - status
 - display 84
- 4 KB program
 - changes 241
 - overview 16

A

- ACF/SNA table generation
 - changes 210
 - overview 8
- address
 - addressing mode
 - description 220
 - specify for 24-bit addressing mode 218
 - specify for 31-bit addressing mode 218
 - specify for IBM C language 218
 - type 218
 - VEQR mode 297
 - block 310
 - conversion
 - EVM to SVM 236
 - SVM to EVM 236
- address attribute
 - SONIC macro 306
- address dispensing mode
 - change current mode 245
 - change for file addressing 244
 - changes 75
 - dispense 244
 - display current mode 75, 245
 - FARF3 75
 - FARF4 75
 - FARF5 75
 - preferred 244
- address format
 - FARF3 12
 - FARF4 12
 - FARF5 12
 - MCHR 8
- address space
 - changes 229, 236
 - ECB virtual memory (EVM) 236
 - manage 236
 - minimize switching 236
 - move between 229, 236
 - move data between 236, 309
 - performance overhead 236
 - system virtual memory (SVM) 236
 - types 213

- adjacent link station (ALS)
 - access application program 253
 - changes 252, 253
 - display status 75
 - overview 8
- advanced communications function/trace analysis program (ACF/TAP)
 - overview 16
- airlines line control (ALC)
 - general 69, 73
 - high-speed lines 72
 - low-speed lines 72
- allocation
 - allocator statement
 - modify 217
 - globals 203
- ALS resource
 - define 252
 - dynamic LU support 252
- alternate mode record
 - FARF record type 246
 - in a file address 246
- application program
 - 31-bit addressing considerations 314
 - access through
 - ALS 253
 - CTC 253
 - NCP 253
 - block scanning 312
 - changes
 - general 305
 - recommended 312
 - utilities 311
 - considerations for application programs
 - instructions 306
 - load real address (LRA) command 306
 - migration 314
 - real addresses 306
 - consolidate application program names
 - consolidate for TPF/APPC 251
 - data sharing considerations 314
 - develop 305
 - ECB checking 312
 - EVENT facility 305
 - file address reference format (FARF)
 - considerations 314
 - get file addresses for program records 226
 - GETPC macro 306
 - global area addresses 305
 - how to test global attribute indicators 311
 - input/output blocks (IOBs) 312
 - lock in storage 306
 - macro considerations 313
 - migration considerations 313
 - modify to share data between ECBs 305
 - monitor system activity 312
 - nesting levels 313
 - query the number of storage blocks 312
 - RELPC macro 306
 - shutdown levels 312
 - unlock from storage 306
- ARINCF lines
 - start lines 73
 - stop lines 74
 - support for 73
- assembly data
 - overview 17
- asynchronous teletype communications (TTY)
 - changes 257
- authorization
 - bits
 - c\$idsalo.h header file 224
 - add your own 223
 - deny authorization privileges to programs 223
 - grant authorization privileges to programs 223
 - run system allocator (SALO) 224
 - user defined 220
- automated patch routine (ARD)
 - activation
 - patch routine 64
 - print routine 64
 - support for 64
 - unit record message filter 64
- automatic cartridge loader feature
 - support for 186
- automation program
 - command impact 261
- auxiliary loader (TLDR)
 - #PVRx record types 207
 - activate 83
 - assembly data 17
 - changes 229
 - general data set (GDS) 266
 - multiple TPF images 266
 - overview 17
 - program versions 17

B

- binary synchronous communication (BSC)
 - alter
 - CCP restart/shutdown polling controls 72
 - multipoint line slow pool interval 72
 - multipoint timeout interval 72
 - priority 72
 - send limit 72
 - display line status 72
 - invalidate a multipoint line station 74
 - start a BSC online test 64
 - start lines 73
 - stop lines 74
 - use 199, 258
 - validate a multipoint link station 74
 - validate lines 74
- block
 - common 12
 - overview 12
 - standard core 12
- block address
 - how to validate 310
- block checking mode
 - debug 278, 293

- block checking mode (*continued*)
 - debug tool 299
 - diagnostic tool 9
 - migration aid 15
 - overview 9, 293, 299
 - performance considerations 278
 - problem determination 293
 - turn off 278, 300
 - turn on 278, 300
 - ZSTRC command 295, 300
- book
 - overview of the TPF 4.1 library 315
- branch trace facility
 - overview 9, 10

C

- C compiler
 - requirements for the TPF 4.1 system 224
- C run-time library
 - system allocator (SALO) 224
- CALOC macro
 - get contiguous pieces of storage 307
- capture
 - changes 279
 - fixed records 284
 - load balancing 280
 - run on multiple modules 280
 - run on single modules 279
- capture and restore
 - add utility names 80
 - assign utility resource ownership 80
 - changes 279, 281
 - define record types 206
 - delete utility names 80
 - description 277
 - display ownership 80
 - load balancing 279
 - overview 9
 - release utility resource ownership 80
 - utility multipathing 9
- catastrophic error processing (CPSF)
 - changes 234
- CCP branch vector table (BVT)
 - overview 259
- CDRM resource
 - define 252, 254
- central processing complex (CPC)
 - description 189
 - product features 190
 - requests for price quotations (RPQs) 190
- central processing unit (CPU)
 - display create macro control levels 67
 - display loop levels 67
- chain chasing
 - online file recoup 283
- channel check
 - channel failures 273
 - disabled wait state codes 274
 - overview 273
 - SVP damage 273

- channel check (*continued*)
 - SVP degradation 273
 - SVP warning 273
 - system recovery messages 274
 - thresholds 273
- channel control word (CCW)
 - areas
 - changes 260
 - pointer table 259
 - changes 230
 - convert virtual addresses to real addresses 230
 - pointer table 259
 - use by I/O routines 230
 - user-built 230
 - user-defined device support routines 230
- channel failure
 - resource impact 273
- channel utilization 279
- channel-to-channel (CTC) connection
 - access application program 253
 - changes 253
 - CTC devices 18
 - definition 252
 - for SNA I/O trace facility 18
 - T5 nodes 252
- CINFC address option
 - overview 15
 - use by the CT99 user exit 232
- CINFC label
 - changes 229
 - CINFC address option 232
 - define 229, 232
 - IBM CINFC labels 232
 - initialize 229, 232
- CINFC table
 - allocate space 232
 - overview 15
- CLASS value
 - core resident programs 219
 - file resident programs 219
- CLEAR keyword 262
- CLH block management table
 - changes 237
- CLU name
 - define 253
- CMMGLBTB table
 - access using the CINFC tag 234
 - convert addresses 234
 - location 234
- code customization
 - changes 229
 - address space 229
 - auxiliary loader (TLDR) 229
 - CINFC labels 229
 - control program 229
 - CXFRC macro 229
 - data collection 229
 - E-type loader (OLDR) 229
 - general 229
 - input/output blocks (IOBs) 229
 - low address protection 229

- code customization (*continued*)
 - changes (*continued*)
 - macro calls 229
 - real-time trace (RTT) facility 229
 - SERRC macro call 229
 - shutdown levels 229
 - SNAPC macro call 229
 - supervisor call (SVC) 229
 - system error package 229
 - system work blocks (SWBs) 229
 - X'18' displacement 229
 - description 229
 - dump content
 - control 229
 - customize 229
- coexistence facilitation
 - overview 9
- collated trace
 - macro trace facility 294
- commands
 - characteristics
 - change 22
 - define 22
 - FILSC 249
 - FINIS 17
 - FINSC 249
 - Z-messages 261
 - ZACLV 216
 - ZAPAT 17, 301
 - ZCTKA 16, 214, 281, 284
 - ZDBRO 284
 - ZDBRO INIT 284
 - ZDBSI 284
 - ZDBSO 284
 - ZDBSO INIT 284
 - ZDDCA 304
 - ZDECD 243, 246
 - ZDPAT 301
 - ZFCAP 279
 - ZFMSG facility
 - change command characteristics 22
 - define command characteristics 22
 - ZIDOT 13, 237, 238
 - ZLREP PT 73
 - ZLRES 73
 - ZLTOF 74
 - ZMEAS 285
 - ZMODE 243, 244, 245, 246
 - ZMPIF 202
 - ZN 79
 - ZNDYN ADD 252
 - ZNDYN CHANGE 254
 - ZNETW ACT 76
 - ZNETW MOUNT 8
 - ZNOPL 211
 - ZNOPL MERGE 11
 - ZNPIU 302
 - ZNTRP 295, 302
 - ZPAGE 22
 - ZPOOL 247
 - ZPTCH 16

- commands (*continued*)
 - ZRTDM 17
 - ZSLDR 211
 - ZSLDR LOAD DATA 81
 - ZSPER 294, 301
 - ZSTRC 20, 234, 278, 295, 296, 298, 300
 - ZSYSG 212, 235, 296
 - ZSYSG ALTER 221
 - ZTDEV 281
 - ZTGRP 281
 - ZTLBL 281
 - ZVFAC 249
 - ZxPAT 16
- common area
 - definition 213
 - description 278
 - ECB relationship 278
- common block
 - get 220
 - get and release 278
 - GETCC macro 220
 - initialization 12
 - system shutdown value 82
- common frame
 - allocate working storage 203
 - description 278
 - ECB relationship 278
 - working storage relationship 214
- common program
 - location of the demand counter 219
- common programming interface (CPI)
 - TPF/APPC sessions 20
- communication
 - non-SNA 199
 - shutdown levels 216, 258
 - SNA 18, 197
 - TCP/IP support 198
- communication control unit
 - 3720 ACF/NCP RPQs by protocol 200
 - 3725 ACF/NCP/VS RPQs by protocol 200
 - 3745 ACF/NCP RPQs by protocol 201
- communication controller
 - types 188
- communications keypoint
 - alter 77
 - display 77
- communications requirement
 - non-SNA 199
 - SNA 197
 - TCP/IP support 198
- computer room agent set (CRAS)
 - display console status 67
 - route messages to CRAS console 80
- configurations
 - 3990 changes 280
 - changes for load balancing 280
- console
 - types 189
- console information
 - display 83

- constraint relief
 - 16 MB 22
 - description 22
 - heap storage 13
 - working storage 22
- contiguous memory
 - changes 212
- contiguous storage
 - get and release 278, 307
 - get in the heap private area 307
- continuous mode
 - data collection 286
- control levels
 - CPU loop
 - display 272
 - modify 272
 - create macro control levels
 - display 272
 - modify 272
 - input list
 - display 272
 - modify 272
- control point LU (CLU)
 - define for each CTC connection to VTAM 252
 - sessions with Logon Manager 252
- control program (CP)
 - CCCTIN residency 226
 - changes 229, 230
 - control program services 236
 - convert non-intercept modifications in data
 - collection 229
 - define 204, 226
 - description 230
 - ECB virtual memory (EVM) 236
 - high mapped memory 236
 - IPL 80
 - macro services 236
 - masked 9
 - overview 9
 - restart 80
 - system virtual low memory 236
- control unit
 - for communication 188
 - for DASD 186
 - for terminal interchange 188
 - loosely coupled complex 193
 - single central processing complex environment 191
 - types 188
- conversation control block (CCB)
 - display a list of CCB IDs for a logical unit (LU) 75
 - display by ordinal number 75
 - display mapped conversation information 75
- core image restart (CIMR)
 - components 21, 266
 - core resident programs 14
 - overview 9, 21
- core resident program
 - bypass the restart load process 221
 - CLASS values 219
 - define the core resident program area (CRPA) 221
 - load methods 221
- core resident program (*continued*)
 - lock into main storage 225
 - memory utilization 14
 - overview 14
 - program allocation 218
- core resident program area (CRPA)
 - define for core resident programs 221
 - overview 10
 - pack programs into 225
 - program size 225
- corefast
 - changes 216
- coreslow
 - changes 216
- CP executable code
 - convert nonintercept modifications 233
 - data collection 233
 - nonintercept modifications 233
- CP TRACE facility
 - program event recording (PER) facility 301
- CPU loop
 - shutdown levels 216
- create macro
 - display control levels 272
 - modify control levels 272
- CRESVC macro
 - macro authorization 305
- CRETVC macro
 - overview 10
- critical record filing
 - changes 234
 - description 234
 - maximum number 234
- cross-subsystem services definition table (CGOT)
 - changes 217
- CT25 user exit
 - use to initialize CINFC labels 232
- CT99 user exit
 - use to initialize CINFC labels 232
- CTC resource
 - define 252, 254
- CTC statement
 - offline ACF/SNA table generation (OSTG)
 - changes 252
- CTL dumps
 - overview 13
- CXFRC macro
 - changes 229
- CY3BON field
 - description 247
- CY3DIR field
 - description 247
 - ordinal restrictions 247
- CY3ORD field
 - description 247

D

- data
 - move between address spaces 309
 - share between ECBs 308

- data alter and display
 - overview 10
- data collection
 - calculate frames for an ECB 214
 - capacity planning 285
 - changes 229, 233, 284, 285
 - control program (CP) executable code 233
 - convert non-intercept modifications to control program (CP) 229
 - convert nonintercept modifications 233
 - description 277, 286
 - how to run 286
 - nonintercept modifications 233
 - performance monitoring 284
 - techniques for collecting data 286
 - ZMEAS command
 - sampling mode 74
 - test mode (continuous) 74
- data collection and reduction
 - overview 10
- data integrity
 - changes 213
 - dynamic address translation (DAT) facility 22
- data record
 - get file addresses 306
- data recovery
 - dynamic address translation (DAT) facility 22
- data reduction
 - capacity planning 285
 - changes 284, 285
 - description 277, 286
 - file reduction reports 289
 - general reduction reports 288
 - input tape changes 286
 - message reduction reports 291
 - output report changes 288
 - performance monitoring 284, 286
 - plot reports 286
 - program reduction reports 290
 - report usage 286
 - system reduction reports 288
- data set
 - general data set (GDS) 10
 - general tape 10
 - partitioned 224
 - virtual reader 10
- data set utility
 - access input devices 268
 - data definition names 268
 - overview 10
- data sharing
 - application program considerations 314
- database administration
 - access
 - I-stream unique records 247
 - processor unique records 247
 - subsystem user (SSU) records 247
 - addressing capacity 241
 - changes 241
 - description 241
 - file address reference format (FARF) 241
 - database administration (*continued*)
 - migration considerations for pools 247
 - program segmentation 248
 - program size 248
 - virtual file access (VFA) 248
 - database protection
 - overview 10
 - database reorganization (DBR)
 - abort processing (MDBF) 66
 - bypass processing (MDBF) 66
 - bypass processing of record types 66
 - changes 283, 284
 - commands 275
 - control records initialization (MDBF) 66, 67
 - control records setup (MDBF) 66, 67
 - description 277
 - display control record information (MDBF) 66
 - display output phase status 66, 67
 - frame allocation 277, 283
 - how to run 283
 - increase the number of frames available 284
 - input eligibility 284
 - input phase 284
 - output phase 284
 - pool record types 284
 - reset record type information (MDBF) 66, 67
 - restart input operations (MDBF) 66
 - restart output following a tape error 66, 67
 - restart output operations 67
 - restart output operations (MDBF) 66
 - set input phase available ECB count (MDBF) 66
 - set output phase available ECB count (MDBF) 66, 67
 - start input operations (MDBF) 66
 - start output operations 66, 67
- databases
 - define 204
 - define UFT/FTI pairs 206
 - file address reference format 4 (FARF4) 204
 - file address reference format 5 (FARF5) 204
- debug
 - block checking mode 278, 293, 299
 - path information unit (PIU) trace facility 293, 301
 - PIUPRT utility 302
 - program event recording (PER) trace facility 293
 - real-time trace (RTT) 293
 - register and S/370 branch trace facility 293
 - register trace facility 295
 - SNA I/O trace facility 293, 303
 - system log trace facility 298
 - system traces 293
 - tools
 - block checking mode 9, 278, 299
 - overview 293
 - tools 293
 - virtual-equals-real (VEQR) mode 293
- decode
 - FARF4 addresses 246
 - FARF5 addresses 246

- demand counter
 - location
 - I-stream unique program 219
 - program allocation table (PAT) 219
 - program header 219
 - manipulate 306
- diagnostic tool
 - block checking mode 9, 293
 - overview 10, 293
 - tools 293
- direct access storage devices (DASD)
 - allocation requirements for programs 248
 - changes 241, 248
 - code
 - get and release IOBs 278
 - conserve DASD space 248
 - control unit types 186
 - destage modified data from cache 65
 - file operations
 - run using VFA buffers 249
 - formatter
 - changes 212
 - loosely coupled complex 193
 - macros 249
 - migrate from DASD IPC to MPIF IPC 202
 - path verification 80
 - single central processing complex environment 191
 - status verification 80
- disabled wait state code
 - IPL CLEAR 274
 - machine check handler 274
 - recovery 274
- display device
 - types 189
- dual control unit communications coupler feature
 - support for 186
- dump
 - controlling content of 239
- dumps
 - code dummy entries 238
 - code overrides 237
 - content
 - control 9, 13, 19
 - control dump content 264
 - description 9
 - overview 9
 - tailor 13
 - control (CTRL) 265
 - control content 229
 - customize content 229
 - dump override table (DOT)
 - control dump content 264
 - user exit 21, 51
 - exclude specific areas 238
 - include specific areas 238
 - modify tags 265
 - multiple volumes 15
 - operational (OPR) 265
 - SERRC 265
 - SERRC macro options 263
 - SNAPC 265
- dumps (*continued*)
 - SNAPC macro options 263
 - switches
 - manipulate 243
 - tapes 261
 - view data 21
- dynamic address translation (DAT) facility
 - 16-MB constraint relief 22
 - changes 212, 213
 - control program changes 230
 - data integrity 22
 - data recovery 22
 - description 22, 212, 213
 - hardware facility 277
 - low address protection 22
 - primary function 277
 - running routines 236
 - set system mask (SSM) instructions 231
 - storage for application programs 22
 - storage for messages 22
 - storage for system programs 22
 - turn on and off 236
 - working storage
 - manipulate 212
 - view 22
- dynamic load function
 - change SNA network definitions 254
 - create resource resolution table (RRT) 211
 - create SNA control blocks 211
 - define
 - network definitions 211
 - SNA resources 211
 - description 211
 - dynamic loads 254
 - dynamic LU support 254
 - error recovery 251
 - fall back to previous resource definitions 210
 - how to use 211
 - initialize SNA control blocks 211
 - load SNA resource definitions 210
 - overview 11
- dynamic LU support
 - change resource definitions for non-LU
 - resources 254
 - change SNA network definitions 254
 - define
 - ALS resources 252
 - resource definitions 252
 - SNA resources 252
 - dynamic loads 254
 - fresh loads 254
 - offline ACF/SNA table generation 252, 254
 - SNA dynamic load function 254
 - SNA fresh function 254
- dynamic override bitmap table (DOBT)
 - changes 238
 - content 238

E

E-type loader (OLDR)

- #PVRx record types 207
- activation number
 - overview 11
- add programs to a loadset 79
- allocate #OLDx records 207
- alter E-type loader
 - rules 79
 - values 79
- assembly data 17
- build E-type loader records 79
- changes 225, 229
- display E-type loader information 79
- E-type loader loadset directory (LSD) 226
- E-type program
 - activate 226, 235
 - activate new program versions 270
 - allocate new programs 217
 - allocate new programs in spare slots 225
 - change program allocation 217
 - changes 235, 305, 306
 - conserve DASD space 248
 - DASD allocation requirements 248
 - description 235
 - how to load 203, 225, 226, 268
 - load new program versions 270
 - load unallocated programs 217
 - loadset relationship 226
 - main storage blocks 277
 - MONTC macro 220
 - program allocation 226
 - program authorization 220
 - program directory (EPD) 226
 - protected storage 220
 - size 212, 248
 - VEQR mode 296
- fallback 79
- initialize file resident E-type loader structures 79
- library function
 - load E-type programs 225
- load function 225
- loader restart 79
- loadset
 - accept 78
 - activate 78
 - deactivate 79
 - delete 79
 - how to load 79
 - manipulation 79
 - relationship 226
 - remove programs from 79
- loadset manipulation 79
- overview 11, 17
- program versions 17
- records
 - #OLDx 206
- recover E-type loader records 79

E-type program directory (EPD)

- loadset relationship 226

ECB activation table (EAT)

- display 67

ECB virtual memory

- layout of 215

enhanced capacity cartridge system tape

- support for 186

enter-by-name

- overview 11

enter/back

- linkage

- reassemble the linkage editor (LEDT) 228

- trace facility

- debug 293

- overview 10, 294, 299

- problem determination 293

ENTNC

- expansions

- activate 235

- keypoint 3 (CTK3) 235

- macro 217, 235

entry control block (ECB)

- allocation

- frames 214

- working storage 203

- changes 214

- common area 278

- common frame 278

ECB check

- activate 83

- deactivate 83

ECB-specific trace

- macro trace facility 294

program nesting area

- changes 217

- description 217

- nesting limit 217

- register save area 231, 232

- set for CPU loop shutdown levels 216

- share data 308

- statistical data 285

- storage sharing 278

- system shutdown value 82

- use data collection reports to calculate frames 214

virtual memory

- address space 236

- addresses in VEQR mode 297

- connect blocks to 236

- convert addresses from EVM to SVM 236

- convert addresses from SVM to EVM 236

- disconnect blocks from 236

- macro services 236

- modify the system error package 236

- storage layout 297

- working storage relationship 214

entry protection

- changes 277

EOCF/2

- software requirements 201

errors

- recovery

- dynamic load function 251

- errors (*continued*)
 - storage overlay 277
- EVENT facility
 - modify programs to share ECBs 305
- event table
 - changes 11
- exception recording
 - changes 249
 - interface to virtual file access (VFA) 249
- exit code
 - GROUP macro 283
- extended global area
 - layout 209
- extended limited lock facility (ELLF)
 - support for 202

F

- FACE table generation
 - changes 204
 - overview 11
- FACZC utility
 - access
 - I-stream unique records 247
 - processor unique records 247
 - description 247
 - differences between FACE and FACS 247
 - output description 247
 - similarities with FACE and FACS 247
- fast link
 - macro decoders 19
 - macro table
 - add macro definitions 232
 - macros 19
- fault-rate threshold
 - changes 235
 - channel failures 235
 - description 235
 - process failures
 - catastrophic 235
 - non-catastrophic 235
 - processor errors 235
- FCTBG offline program
 - generate
 - CYMZ table 208
 - DASD deck 208
 - FACE table 208
 - SYCON table 208
 - record types 208
 - run to generate a FACE table 245
- feature
 - High Performance Option (HPO) 7
 - Multi-Processor Interconnect Facility (MPIF) 7
 - softcopy publications 8
 - TPF Application Requester (TPFAR) 7
- field
 - CY3BON 247
 - CY3DIR 247
 - CY3ORD 247
 - new fields 247

- file
 - alteration 8
 - restoration 281
- file address compute program (FACE)
 - FACE table
 - build 209, 246
 - changes 11, 208, 212, 218, 247
 - content 242
 - generate for FARF3 to FARF4 migration 245
 - how to access 247
 - how to load 245, 246
 - IBM MVS linkage editor (LEDT) 208
 - subsystem index 247
 - table generation 19, 208, 242, 246
 - universal format type (UFT)/format type indicator (FTI) conversion table location 242
 - use of ordinals to access 247
 - overview 21
 - system initialization 19
- file address compute program (FACE) table
 - user exit 54
- file address reference format (FARF)
 - application program considerations 314
 - changes 241
 - convert to extended MCHR format addresses 65, 74
 - display from record type and ordinal number 66
 - file address reference format 3 (FARF3) 241
 - file address reference format 4 (FARF4) 241
 - file address reference format 5 (FARF5) 241
 - migration aid 15
 - new address formats 241
 - records
 - alternate mode record 246
 - input/output blocks (IOBs) 246
 - remove 246
- file address reference format 3 (FARF3)
 - addressing capacity 12
 - changes 241
 - coexistence 242
 - coexistence with FARF5 243
 - convert to FARF4 244
 - description 241
 - dispensing modes 75
 - file address compute program (FACE) table 242
 - flag old FARF3 addresses 246
 - generate FACE table for migration to FARF4 245
 - indicator bits 242
 - layout 241
 - migrate to FARF4 242, 245
 - migrate to FARF5 242
 - migration considerations 245
 - record type 246
 - restrictions 241
- file address reference format 4 (FARF4)
 - address dispensing while migrating to FARF5 244
 - addressing capacity 12, 242
 - changes 204
 - characteristics 242
 - coexistence 242
 - decode FARF4 addresses 246

- file address reference format 4 (FARF4) *(continued)*
 - description 241
 - differences with FARF5 242
 - dispensing modes 75
 - file address compute program (FACE) table 242
 - generate FACE table for migration from FARF3 245
 - indicator bits 242
 - layout 243
 - migrate from FARF3 242, 245
 - migrate to FARF5 242, 243, 246
 - restrictions 243
 - storage in universal format type (UFT)/format type
 - indicator (FTI) conversion table 242
 - structure 243
 - use as a migration path between FARF3 and FARF5 243
- file address reference format 5 (FARF5)
 - addressing capacity 12, 242
 - changes 204
 - characteristics 242
 - coexistence 242
 - coexistence with FARF3 243
 - decode FARF5 addresses 246
 - description 241
 - differences with FARF4 242
 - dispensing modes 75
 - layout 244
 - migrate from FARF3 242
 - migrate from FARF4 242, 243, 246
 - storage in universal format type (UFT)/format type
 - indicator (FTI) conversion table 242
 - structure 243
- file addresses
 - addressing capacity
 - expansion 241
 - FARF3 12
 - FARF4 12
 - FARF5 12
 - limitations 241
 - overview 12
- alter
 - data records 306
 - program records 306
- database reorganization considerations 245
- decode FARF4 addresses 246
- decode FARF5 addresses 246
- determine address format 245
- flag old FARF3 addresses 246
- get address attributes 306
- migrate FARF3 to FARF4 242, 245
- migrate FARF3 to FARF5 242
- migrate FARF4 to FARF5 246
- migrate FARF5 to FARF5 243
- migration considerations 242
- online file recoup considerations 245
- structure of FARF4 and FARF5 243

- file reduction report
 - changes 289
 - data reduction 289
- file resident program
 - program allocation 218

- file resident program *(continued)*
 - summary of CLASS values 219
- first-in-first-out (FIFO)
 - control unit buffer recover 186
 - definition 186
- fixed file record
 - #SALTB 158
 - #WRES4 158
 - #WRESL 158
 - #WRESS 158
 - #XTCBR 158
 - band number 246
 - capture 284
- format 1 (FMT1) CCW
 - overview 19
- format indicator (FTI)
 - FARF4 structure 243
 - FARF5 structure 243
- frames
 - overview 12
 - set for CPU loop shutdown levels 216
 - system shutdown value 82
 - working storage relationship 214
- fresh load function
 - change SNA network definitions 254
 - define SNA resources 211
 - description 211
 - dynamic LU support 254
 - fresh loads 254
 - how to use 211
 - SNA data loader 211
 - SNA fresh function 254
- full load
 - perform to start a TPF 4.1 system 216
- function switch
 - add your own 223
 - definition 223
 - naming conventions 223
 - restrictions 223

G

- gateway aliasing
 - definition 253
- general data set (GDS)
 - auxiliary loader (TLDR) 266
 - content 251
 - FILE macro 313
 - FIND macro 313
 - load program data 83
 - network definitions 251
 - offline ACF/SNA table generation (OSTG) 210
 - overview 10, 18
 - virtual reader 225
 - write network definitions to 210
- general file keypoint
 - reassemble 203, 227
- general file loader (ALDR)
 - #PVRx record types 207
 - assembly data 17
 - changes 212

general file loader (ALDR) (*continued*)

- format 212
- multiple TPF images 266
- overview 12, 17
- program versions 17
- reformat 212

general real-time code

- overview 12

general reduction report

- changes 288
- data reduction 288

generic name support

- changes 252
- use in session requests 252

GETCC macro

- access private storage 307

GETPC macro

- get file addresses for
 - data records 306
 - program records 306
- lock programs 306

global area

- define 203
- I-stream shared 209
- I-stream unique 209
- size 209

global attribute indicator

- how to test 311

global directory

- I-stream shared globals 209
- I-stream unique globals 209

global load function

- description 216

globals

- 16 MB
 - overview 9
 - primary global area 209
- allocate 209
- allocation 203
- create a pilot tape 203
- I-stream shared 203
- layout
 - extended global area 209
- modify
 - I-stream unique 311
 - pilot tape 203

H

hardware facilities

- changes 277
- dynamic address translation (DAT) facility 277
- entry protection 277
- low address protection 277
- program event recording (PER) trace facility 293
- program isolation 277
- register and S/370 branch trace facility 293

hardware requirement

- consoles 189
- control units 188
- display devices 189

hardware requirement (*continued*)

- interconnection devices 187
- prerequisites for the TPF 4.1 system 185
- tape libraries 186
- tape units 186
- terminals 189
- unit record devices 187

heap storage

- constraint relief 13
- definition 13
- get 307
- how to manage 307
- overview 13
- release 307

high mapped memory

- macro services 236

high memory

- application program use 209
- global residency 209

High Performance Option (HPO) feature

- overview 7

high-speed lines

- start 74
- stop 74
- support for 72, 73

I

I-stream

- globals
 - how to modify 311
- programs
 - location of the demand counter 219
- records
 - FACZC utility 247
 - how to access 247

I/O trace facility

- input/output (I/O) trace 14
- overview 10, 14, 294, 299

IBM 3088 Multisystem Channel Communication Unit 187

IBM 3505 Card Reader 187

IBM 3737 Remote Channel-to-Channel Unit Model 1 187

IBM 4248 Impact Line Printer Model 2 187

IBM 9032 Enterprise Systems Connection Director (ESCD) Model 2 187

IBM 9033 Enterprise Systems Connection Director (ESCD) Model 1 188

IBM 9034 IBM ES Connection Converter Model 1 188

IBM 9035 ESCON Converter Model 2 188

IBM C language support

- c\$ldfunc.h header file 221, 223
- c\$idsalo.h header file 223, 224
- calloc 307
- malloc 307
- 31-bit mode 220
- access CINFC labels 232
- addressing mode allocation 218
- C run-time library 224
- code entries in C\$UCNFEQ 232

- IBM C language support (*continued*)
 - code the UCNFEQ macro 232
 - define authorization bits for program privileges 223
 - overview 13
 - program allocation 220
 - run-time library for E-type loader (OLDR) 225
- IBM C/C++ for MVS/ESA Version 3 Release 1 compiler support for 197
- IBM ESCON channel adapter
 - support for 186
- IBM OS/390 C/C++ Version 1 Release 2 compiler support for 197
- IBM OS/390 C/C++ Version 1 Release 3 compiler support for 197
- IBM OS/390 C/C++ Version 2 Release 10 compiler support for 197
- IBM OS/390 C/C++ Version 2 Release 4 compiler support for 197
- IBM OS/390 C/C++ Version 2 Release 6 compiler support for 197
- IBM OS/390 C/C++ Version 2 Release 8 compiler support for 197
- IBM OS/390 C/C++ Version 2 Release 9 compiler support for 197
- IBM z/OS Version 1 Release 2
 - support for 197
- IBMPAL
 - use by the system allocator (SALO) program 217, 224
- IDATG call
 - IBM provided 238
 - selective memory dump table (SMDT) 238
- IDOTB call
 - code dump overrides 238
 - code prefixes 238
 - generate entries in your static override bitmap table (SOBT) 238
 - override what is coded 238
- IDOTB macro
 - associate system error numbers with keywords in selective memory dump table (SMDT) 238
 - use to provide IDATG calls to selective memory dump table (SMDT) 238
- image pointer record 14
 - VEQR (virtual-equals-real) mode
 - See virtual-equals-real (VEQR) mode
- improved data recording capability (IDRC)
 - support for 186
- indexed macro table
 - add macro definitions 232
- indexed supervisor call (SVC)
 - changes 231
 - IBM reserved 231
 - specify in supervisor call (SVC) tables 231
 - support levels 231
 - user reserved 231
- indicator bit
 - description 242
 - FARF3 use 242
 - FARF4 use 242
- indirect data addressing (IDAW)
 - changes 230
- initial program load (IPL)
 - destructive IPL 274
 - program allocation table (PAT) changes taking effect 63
 - release a data set 69
 - restart a control program (CP) 80
- input deck
 - changes 217
 - content for system allocator (SALO) 218
 - IBM defined 217
 - IBMPAL 217, 224
 - limitations 217
 - SKPAL 228
 - user defined 217
- input devices
 - assign data definition names 268
- input list
 - display control levels 272
 - modify control levels 272
 - size 216
- input statements
 - allocate spare program slots 222
 - allocate transfer vectors 221
 - define pools 222
- input/output block (IOB)
 - application program use 312
 - changes 214, 229, 230
 - DASD code 278
 - get and release 278
 - set for CPU loop shutdown levels 216
 - supply the file address of the FARF record 246
 - system shutdown value 82
 - working storage relationship 214
- instructions
 - application program considerations 306
- inter-I-stream communication
 - changes 235
 - description 235
- interconnection device
 - types 187
- interface
 - changed for the TPF 4.1 system 23
 - new for the TPF 4.1 system 23
 - obsolete for the TPF 4.1 system 23
- internal event facility
 - changes 233
 - description 233
 - table size 233
- interprocessor communications (IPC)
 - changes 202
 - DASD to MPIF 202
 - for high performance option (HPO) 202
 - HPO feature 14
 - MPIF 14
 - overview 14
- IPLB
 - duplicate volume serial number (VSN) 274
 - overview 274

J

JCL

- multiple-volume serial numbers 261
- serial numbers 261

JDCD tape

- data collection changes 285

K

key-protected

- memory
- program residency 219
- storage
- description 219

keypoint

- back up 267
- BXAX 206
- CTK3 14
- CTK5 14, 266
- CTKX 14
- general file keypoint 203, 227
- keypoint 3 (CTK3)
 - activate ENTNC expansions 235
 - changes 217, 235
- keypoint 9 (CTK9)
 - how to load 248
 - migration considerations 248
 - pool data structures 248
- keypoint staging area 267
- keypoint X (CTKX)
 - changes 266
- multiple TPF images 267
- overview 14
- staging area 267
 - description 267
 - store copies of keypoints 267
- working keypoints 267

keyword

- associate system error numbers with keywords 238
- associate with regions of storage 237
- CLEAR 262
- control program table allocation 262
- create temporary keywords 237
- define 237
- predefined 237
- tape processing 262
- TPFDF 262
- use to map addresses of large storage areas 238
- VEQR 262

L

least recently used (LRU) algorithm

- virtual file access (VFA) tuning 249

limited lock facility (LLF)

- address placement on channels 280
- capture load balancing 280
- static switch 280

linkage editor (LEDT)

- IBM MVS object module 208

linkage editor (LEDT) (*continued*)

- reassemble 203
- reassemble for enter/back linkage 228
- run considerations 227
- use of the system allocator (SALO) table 224

list of literals (LTORG)

- space savings 203, 225

load

- balancing
 - capture 280
 - capture and restore 279
 - resource requirements 280
- deck
 - changes to cross-subsystem services definition table (CGOT) 217
 - for E-type loader (OLDR) 225
- real address
 - considerations 306

loadset

- accept 78
- activate 78
- add programs to a loadset 79
- alter E-type loader
 - rules 79
 - values 79
- deactivate 79
- definition 225
- delete 79
- directory
 - E-type loader (OLDR) 226
- display E-type loader information 79
- how to load 79
- manipulation 79
- remove programs from a loadset 79

logical blocks

- types
 - logical ECB-unique working storage (LFRAME) 312
 - logical entry control block (LECB) 312
 - logical I/O block (LIOB) 312
 - logical shared working storage (LCOMMON) 312
 - logical system work block (LSWB) 312

logical storage

- changes 213
- use of
 - dynamic address transation (DAT) facility 213
 - low address protection 213

logical unit (LU)

- description 251
- display information about 76
- list of CCB IDs 75
- naming conventions for SNA communication 226
- remote TPF/APPC LU 76
- send unsolicited system messages to 81

logon manager

- CLU session 253
- description 251
- logical unit (LU) 251

long message transmitter (LMT)

- purge queue 79
- repeat last message 80

- long tape interrupt
 - detect and report 20
 - tape support 20
- low address protection
 - changes 213, 229, 233
 - definition 233
 - description 277
 - dynamic address translation (DAT) facility 22
 - hardware facility 277
 - modify 233
 - overview 14
 - turn on and off 233
- low address protection facility
 - description 213
- low core
 - modify 204, 228
- low storage
 - changes 233
 - modify 233
- low-speed controlled telegraph (LSCT)
 - changes 257
- low-speed free running (LSFR)
 - changes 257
- low-speed lines
 - balancing ratios
 - alter 73
 - display 72
 - start 74
 - stop 74
 - support for 72
 - support for was dropped. 69
- LU 6.2 session
 - activate 76

M

- machine check
 - checks
 - disabled wait state codes 274
 - overview 273
 - SVP damage 273
 - SVP degradation 273
 - SVP warning 273
 - system recovery messages 274
 - thresholds 273
 - handler
 - disabled wait state 274
- macro authorization
 - considerations when issuing 310
 - CRESVC macro 305
 - options for program authorization 220
 - specify for program allocation 216
- macro calls
 - changes 229
 - SERRC 237
 - SNAPC 237
- macro decoder
 - changes 231
 - fast link 19
 - fast-link service 231
 - system service request 19

- macro decoder (*continued*)
 - table changes 231
- macro definitions
 - add to macro tables 232
- macro information table
 - access information 232
 - create entries 231
- macro tables
 - add macro definitions 232
 - fast-link macro table 232
 - indexed macro table 232
 - primary macro table 232
- macro trace facility
 - changes 234
 - debug 293
 - description 234
 - overview 14, 294, 299
 - problem determination 293
 - turn on and off 234
 - types
 - collated trace 294
 - ECB specific 294
- macros
 - \$GCOMC 278
 - \$GETBC 278, 309
 - \$GETCC 309
 - \$GIOBC 278, 309
 - \$GMNBC 278
 - \$GSWBC 278, 309, 312
 - \$RCOMC 278
 - \$RELBC 278, 309, 312
 - \$RIOBC 278, 310
 - \$RMNBC 278
 - \$RSWBC 278, 312
 - \$TCPLC 10, 20
 - ADDLC 309
 - application programs
 - migration considerations 313
 - ATOLC 309
 - BACKC 294
 - BEGIN 9, 203, 227
 - BLKBC 309
 - CALOC 13, 305, 307, 308
 - CCPPOL 259
 - CINFC 223
 - CLHCC 309
 - CLHEC 309
 - CONFIG 204
 - CREDC 283
 - CREEC 305, 308
 - CRESVC 305
 - CRETC 305, 308
 - DATA CO 285
 - DATA CO SIP 10
 - Enter/Back macros 285
 - ENTNC 217
 - ENTxC 294
 - ESFAC 245, 247
 - FACE 248
 - FACEA 204
 - FAC EC 204

macros (continued)

- FACS 248
- FACZC 11, 248
- fast link 19
- FDCTC 249
- FILE 10, 249, 313
- FIND 249, 313
- FINIS 12
- FREEC 13, 308
- GENSIP 223, 224
- GETBC 309
- GETCC 12, 220, 223, 305, 307, 308
- GETFC 12, 248, 312
- GETLC 12, 312
- GETPC 12, 13, 226, 306
- GETPC macro 306
- GETSC 12, 312
- GIOBC 309, 312
- GLOBAL 209
- GROUP 283
- GSVAC 312
- GSYSC 13
- GTMBBC 309
- IDOTB 13
- IGATC 311
- INDSN 217, 224
- INQRC 251, 254
- LMONC 220
- LOCORE 203, 228
- LOMET 300
- macro authorization 310
- MALOC 13, 305, 307, 308
- MAXBC 312
- MODEC 306
- MONTC 220, 223, 277, 278
- MOVEC 305, 309
- MSGRTA 253
- NTYPC 309
- NUMBC 312
- NXTBC 309
- ONLFIL 204
- ORDBC 309
- PAL 217
- PTV
 - phase I 300
- RALOC 13, 308
- RAMFIL 204
- RELBC 309
- RELPC 306
- RIATA 208
- RIOBC 310, 312
- RLMBC 310
- RSYSC 13, 17
- SERRC 263, 264, 309
- SIP GLOBAL 203
- SIP macros 285
- SIPCC 202
- SKIPT 300
- SNAKEY 302
- SNAPC 263, 309
- SON macros 285

macros (continued)

- SONIC 245, 247
- SONIC macro 306
- SSDEF 204
- storage manipulation 309
- STPMT 300
- STPPT 300
- SWISC CREATE 311
- SWISC ENTER 311
- SYSTC 211
- SYSUG 211
- TAPE 10
- UFTFTI 205
- VALBC 310
- VFA macros 285
- WTOPC 21, 22

main storage

- application program use 13
- blocks for E-type programs 277
- changes 212, 213
- locking programs into 203
- manipulate
 - above 16 MB 212
 - use the DAT facility 212
- modify
 - ZACOR command 271
 - ZADCA command 271
 - ZAPGM command 271
- overview 13
- program locking 225
- resident program allocation 218
- storage layout 297
- use by application programs 213

MALOC macro

- get contiguous pieces of storage 307

manipulate

- demand counter 306
- program demand counter 306

MCHR

- address format overview 8

memory

- contiguous memory 212
- ECB virtual memory (EVM) 236
- high mapped memory 236
- high memory 209
- key-protected memory 219
- page-protected memory 219
- patch decks
 - maintain 271
 - ZPTCH command 271
- real memory 209
- system virtual low memory 236

message

- reduction reports
 - changes 291
 - data reduction 291
- routing
 - to CRAS console 80
- system recovery 274

migration

- address dispensing from FARF4 to FARF5 244

- migration (*continued*)
 - aids
 - block checking mode 15
 - file address reference format (FARF) 15
 - multiple TPF images 15
 - overview 15
 - TPF Migration Guide: Program Update Tapes 15
 - VEQR mode 15
 - virtual-equals-real (VEQR) mode 15
 - application programs
 - changes 305
 - migration considerations 313
 - reentrancy considerations 313
 - checklist 3
 - considerations for
 - application programs 313, 314
 - macros 313
 - FARF3 to FARF4 242, 245
 - FARF3 to FARF5 242
 - FARF4 to FARF5 242, 243, 246
 - file addresses 242
 - generate FACE table for FARF3 to FARF4 245
 - online file recoup considerations when migrating file addresses 245
 - overview of steps 185
 - plan 3
 - RAMFIL statement to record migration 243
 - reentrancy considerations
 - application programs 313
 - test 293, 296
- MODE
 - continuous mode for data collection 286
 - MODE statement
 - description 218
 - format 218
 - specify 218
 - sampling mode for data collection 286
 - virtual-equal-real (VEQR) 293, 296
- monitor call (MC) facility
 - changes 232
 - decoder 233
 - instruction for SNAPC, \$MONTC, and \$REVCV
 - macros 231
 - instruction operands 232
 - service routines 233
- move data between address space
 - MOVEC macro 305, 309
 - overview 309
- MOVEC macro
 - move data between address spaces 305, 309
- MPIF IPC 202
- MPIFC macro
 - changes 235
- Multi-Processor Interconnect Facility (MPIF)
 - changes 235
 - define device 75
 - define path 75
 - delete device 75
 - delete path 75
 - display parameters 75
 - hardware table record verification 75

- Multi-Processor Interconnect Facility (MPIF) (*continued*)
 - keypoint E verification 75
 - migration 202
 - overview 7
 - path definition record verification 75
 - request service 235
 - set parameters 75
 - start device 75
 - start path 75
 - stop device 75
 - stop path 75
 - support for 196
 - trace path 75
 - trace user 75
- multi-volume dump
 - overview 15
- multipathing
 - load balancing for capture and restore 279
 - support for 186
- multiple database function (MDBF)
 - changes 234
 - commands 66, 67
 - critical record filing 234
 - DBR control record
 - display information 66
 - initialize 67
 - set up 67
 - DBR input
 - restart operations 66
 - set phase available ECB count 66
 - start operations 66
 - DBR output
 - display phase status 67
 - restart following a tape error 67
 - restart operations 67
 - set phase available ECB count 67
 - start operations 67
 - DBR processing
 - abort 66
 - bypass 66
 - reset DBR record type information 67
- multiple TPF images
 - auxiliary loader (TLDR) 266
 - display 266
 - general file loader (ALDR) 266
 - integrate changes 265
 - keypoints 267
 - maximum number of images allowed 265
 - migration aid 15
 - modify 266
 - overview 15, 265
 - primary image 265

N

- NCP resource
 - define 252, 254
- network address table (NAT)
 - changes 252
- network addressable unit (NAU)
 - activate 76

- network addressable unit (NAU) (*continued*)
 - changes 251, 254
 - deactivate 76
- network command status table (NCST)
 - display 77
- network control program (NCP)
 - access application program 253
 - changes 253
 - dynamic load relationship 211
- network definition
 - changes 210, 251, 254
 - define new definitions 211
 - dynamic load relationship 211
 - dynamic LU support 254
 - fall back to previous network definitions 251
 - install new definitions 210
 - load 251
 - load resource definitions 254
 - modify for SNA 251
 - update input data sets 254
- network extension facility (NEF)
 - 2946-1980-24 terminal reset 73
 - changes 257
- network node name
 - convert 251, 254
- node control block (NCB)
 - create 211
 - initialize 77, 211
- non-LU resource
 - ALS resources 254
 - CDRM resources 254
 - change resource definitions 254
 - CTC resources 254
 - NCP resources 254
- non-SNA communication
 - changes 257
 - operating environment 199
 - overview 16
- NORM state
 - load network definitions 251

O

- offline ACF/SNA table generation
 - CTC statement changes 252
 - define for SNA communication 226
 - dynamic LU support 254
 - update input data sets 254
 - write network definitions
 - to a general data set (GDS) 210
 - to tape 210
- offline allocator
 - compatibility checking 226
 - run 226
- offline pool maintenance program (DYOPM)
 - definition 247
- offline processing
 - input tape 286
 - reports 288
- offline SNA table
 - define 203
- online file recoup
 - APAR PJ21224
 - highlights 282
 - migration 282
 - overview 282
 - chain chasing 283
 - changes 282
 - control unit buffering 282
 - database corruption 282
 - description 282
 - file address migration 245
 - GROUP macro 283
 - offline program sequence checking 282
 - phases 282
 - recoup descriptor writer (BKDR) 282
 - recoup logging block 282
 - restart checkpoint mechanism 282
 - tape blocking 282
 - tapes
 - RCI 282
 - RCP 282
 - RPC 282
 - RPE 282
- online general file loader (ACPL)
 - description 12, 228
 - receive messages from 204, 228
- online mini dump facility
 - overview 294
 - system error hooks 21
- online module
 - reformat 203, 212
- online patch facility
 - overview 16
- operational change
 - automation program impact 261
 - overview 261
 - summary 261
- ordinal
 - access the file address compute program (FACE)
 - table 247
 - changes 247
 - number 217
 - restrictions 247
- origin and destination network identifier (NETID)
 - description 295
- output message transmitter (OMT)
 - purge queue 78, 79
 - repeat last message 78, 80
- output report
 - file reduction reports 289
 - general reduction reports 288
 - message reduction reports 291
 - program reduction reports 290
 - system reduction reports 288
 - types 288

P

- P1024 test
 - perform 74
 - synchronous link 74

- page-protected memory
 - program residency 219
- paging control
 - WTOPC 22
- patching
 - changes 228
 - description 228
- path information unit (PIU) trace facility
 - activate 272, 295
 - changes 256
 - commands 75, 76, 78
 - deactivate 272, 295
 - debug 293
 - overview 10, 16, 293, 294
 - problem determination 293
 - trace table
 - display 77
 - size 77
 - ZNTRP command 295
- performance monitoring
 - data collection 284
 - data reduction 284
 - offline facility for virtual file access (VFA) 248
 - online facility for virtual file access (VFA) 248
 - overview 16
- physical storage
 - changes 213
 - use of
 - dynamic address translation (DAT) facility 213
 - low address protection 213
- pilot tape
 - content 251
 - create for globals 203
 - load 251
 - modify for globals 203, 215
- PIU trace table
 - content
 - data 295
 - printing 295
 - define entry length 302
 - define size 295, 302
 - size definition 295, 302
- PIUPRT utility
 - activate 302
 - changes 256
 - deactivate 302
 - debug 301, 302
 - enhancements 302
 - information in PIU trace table 302
 - input parameters 302
 - output format 303
 - overview 301, 302
 - PIU trace table
 - define entry length 302
 - define size 302
 - size definition 302
 - print data
 - compact table format 303
 - formatted table 303
 - long format 303
 - problem determination 301, 302
- PIUPRT utility (*continued*)
 - specify which resources to trace 302
 - write to real-time tape 302
- planning information
 - checklist 3
 - migration 3
- plot report
 - data reduction 286
 - description 286
- pool directory
 - changes 247
 - description 247
- pool file address
 - limitations 241
 - migration 248
 - migration restrictions 248
- pool ordinal number
 - changes 248
- pool record
 - layout changes 248
 - types
 - changes 248
 - database reorganization 284
 - ordinal 246
- pool type name
 - #IP4DP 248
 - #IP4LT 248
 - #IP4ST 248
 - #IPLDP 248
 - #IPLLT 248
 - #IPLST 248
 - #IPSDP 248
 - #IPSLT 248
 - #IPSST 248
 - description 248
- pools
 - address limitations 241
 - allocate 217
 - define 222
 - fall back to a TPF 3.1 system 247
 - format of input slots for defining pools 222
 - how to access 306
 - keypoint 9 (CTK9) 248
 - migration considerations 247, 248
 - pool data structures 248
 - pool directories 247
 - pool file addresses 248
 - pool ordinal number 248
 - pool record layout 248
 - pool record type 248
 - pool type names 248
- post processing
 - tapes 261
- prefix
 - ANSI C functions 238
 - application program impact 238
 - code 238
 - default for SERRC macro calls 238
 - distinguish your system error numbers from IBM 238
 - IBM reserved 238

- prefix (*continued*)
 - number for system errors 19
 - SERRC macro call impact 238
 - use to
 - distinguish between system errors 238
 - group system errors 238
- prerequisites for the TPF 4.1 system
 - hardware 185
 - product features 196
 - programming requirements 196
 - software 196
- presentation services (PS)
 - changes 251
- primary global area
 - layout 209
- primary logical unit (PLU)
 - processing for TPF/APPC 76
- primary macro table
 - add macro definitions 232
- print
 - PIU data 303
- private program
 - description 219
 - how to load 219
- private storage
 - how to access 307
- problem determination
 - block checking mode 293, 299
 - overview 293
 - path information unit (PIU) trace facility 293, 301
 - PIUPRT utility 302
 - program event recording (PER) trace facility 293
 - real-time trace (RTT) 293
 - register and S/370 branch trace facility 293
 - register trace facility 295
 - SNA I/O trace facility 293, 303
 - system traces 293
 - tools 293
 - virtual-equals-real (VEQR) mode 293
- procedure correlation identifier (PCID)
 - description 295
- process selection vector (PSV)
 - table changes 252
- processor
 - failures
 - resource impact 273
 - records
 - access a virtual file access (VFA) candidate 247
 - FACZC utility 247
 - how to access 247
- product feature
 - requirements 196
 - Transmission Control Protocol/Internet Protocol
 - full-duplex socket support 201
- program
 - 4 KB programs 241
 - allocate 216, 217
 - changes 305
 - combining programs into 4 KB records 241
 - common programs 219
 - conserve DASD space 248

- program (*continued*)
 - core resident programs 218, 221, 225
 - DASD allocation requirements 248
 - develop 305
 - E-type programs 248
 - EVENT facility 305
 - file resident programs 218, 219
 - global area addresses 305
 - I-stream unique programs 219
 - main storage resident programs 218
 - modify to share data between ECBs 305
 - packing into 4 KB records 241
 - private programs 219
 - resegmenting into 4 KB records 241
 - shared programs 219
 - unprotected programs 219
- program allocation
 - allocation considerations 216
 - changes 216
 - description 218
 - E-type loader 217
 - format of input statements 218
 - macro authorizations 216
 - options 216
 - overview 17
 - self-modifying programs 219
 - statement size 218
 - VFA candidate options 216
- program allocation table (IPAT)
 - allocation
 - allocate new E-type programs in spare slots 225
 - allocate spare program slots 222
 - changes 11, 217, 287
 - commands 68
 - create 217
 - description 217
 - display table 68, 268
 - location of the demand counter 219
 - modify table 268
 - overview 16
 - produced by system allocator (SAL) 224
 - run SALO to create 203
 - use by system allocator (SALO) 217, 224
- program authorization privileges 223
- program collector logic changes 233
- program event recording (PER) trace facility
 - activate 272
 - change 272
 - CP TRACE facility 301
 - debug 293
 - display status 272
 - functions 301
 - modify data 21
 - options
 - alter 81
 - display 81
 - overview 10, 16, 272, 293, 294, 300
 - performance cost 294
 - problem determination 293
 - reallocate programs as common 301

- program event recording (PER) trace facility *(continued)*
 - run
 - in a native system 301
 - on VM 301
 - run in a native system 301
 - set system mask (SSM) instructions 231
 - test environment 301
 - user exit 51
- program header
 - location of the demand counter 219
- program linkage
 - programs that are not link edited 227
 - save information 217
 - use of ECB program nesting areas 217
- program locking
 - main storage 225
 - storage 306
- program nesting
 - overview 16
- program record
 - changes 241
 - get file addresses 306
 - number
 - changes 217
 - description 217
 - ordinal number 217
 - program allocation 218
 - size 241
- program reduction report
 - changes 290
 - data reduction 290
- program segmentation
 - description for database administration 248
- program sharing table (PST)
 - content 224
 - description 224
 - for the system allocator (SALO) 224
 - overview 16
- program size
 - description for database administration 248
- program slot
 - add programs without a full load 222
 - allocate spare slots 222
 - delete programs without a full load 222
 - format of input statements for allocating spare
 - program slots 222
 - how to load programs 222
- program test vehicle (PTV)
 - APTV 300
 - control program 300
 - deactivate 82
 - overview 300
 - phase I
 - macros 300
 - unit test 296
 - program loads 300
 - reset 82
 - set to
 - phase 3 82
 - system test vehicle (STV) phase 82

- program version
 - information
 - #PVRx record types 207
 - content 207
 - define record types 207
 - overview 17
 - records
 - #PVRx record types 207
 - define record types 207
- protected storage
 - E-type programs 220
 - for E-type programs 220
- pseudo lines
 - display lines 72
 - start lines 74
 - stop lines 74
- PTV Phase I macro group changes 234

R

- real address
 - application program considerations 306
 - convert from virtual addresses for use by
 - CCWs 230
- real memory
 - description 209
 - global residency 209
- real storage
 - reserve for application program use 209
- real-time
 - program management
 - changes 305
 - overview 17
 - tape 279
- real-time trace (RTT) facility
 - changes 229, 234, 279
 - debug 293
 - description 234, 277
 - overview 10, 293, 294
 - problem determination 293
 - RTT option tables 234
 - start 83
 - trace buffer 234
- receive-only computer room agent set (RO CRAS)
 - console 251
 - summary of logical unit (LU) names 251
- record
 - 4 KB 241
 - data record 306
 - display 271
 - fixed file 246
 - flush from virtual file access (VFA) 249
 - I-stream unique record 247
 - modify 271
 - overview 17
 - pool record 246
 - processor unique record 247
 - program records
 - changes 241
 - size 241
 - purge from virtual file access (VFA) 249

- record (*continued*)
 - subsystem user (SSU) record 247
 - type
 - define 244
 - define for capture and restore 206
 - for the FCTBG program 208
- record cache subsystem (RCS)
 - map RSC SSID/device addresses 65
- record hold table
 - overview 17
- record ID attribute table (RIAT)
 - changes 12, 218
 - defined on RIAT macro 284
 - entry
 - display 81
 - modify 81
 - overview 17
 - record type
 - #OLDx 207
 - #PVRx 208
- recoup descriptor writer (BKDR)
 - enhancements 282
- recoup GROUP macro
 - overview 17
- reentrancy
 - considerations for application programs 313
- reformat online modules 203
- register and S/370 branch trace facility
 - debug 293
 - overview 294, 299
 - problem determination 293
- register trace facility
 - debug 295
 - overview 295, 299
 - problem determination 295
- release storage 307
- release summary
 - areas with changes in the TPF 4.1 system
 - TPF 3.1 to TPF 4.1 system 8
 - features of the TPF 4.1 system 7
 - overview 7
- RELPC macro
 - unlock programs 306
- remote LU resources
 - define
 - resource definitions 252
 - SNA resources 252
 - dynamic LU support 252
- reports
 - data collection changes 285
 - data reduction changes 285, 286
 - file reduction reports 289
 - general reduction reports 288
 - message reduction reports 291
 - output reports 288
 - plot reports 286
 - program reduction reports 290
 - program reports 285
 - system reduction reports 288
- request for price quotation (RPQ)
 - by protocol 200
- request for price quotation (RPQ) (*continued*)
 - support for 190
 - Transmission Control Protocol/Internet Protocol
 - full-duplex socket support 201
- requirements
 - hardware 185
 - product features 196
 - software 196
- resource control
 - overview 17
- resource definitions
 - ALS resources 252, 254
 - CDRM resources 252, 254
 - change for non-LU resources 254
 - commands 252, 254
 - CTC resources 252, 254
 - define 252
 - define for remote LU resources 252
 - local applications 252
 - LU resources 252
 - dynamic LU support 252
 - load SNA resource definitions 210
 - NCP resources 252, 254
- resource identifier (RID)
 - changes 251, 255
 - specify 76
- resource resolution table (RRT)
 - changes 211
 - content 210, 211
 - create 211
- resource vector table (RVT)
 - changes 252, 287
 - create 211
 - display addresses 78
 - display content 78
 - initialize 78, 211
- restart load process
 - bypass 221
 - for core resident programs 221
- restore
 - file 281
 - records that cannot be restored 281
 - TPF images 281
- route messages
 - to CRAS console 80
- routing control application table (RCAT)
 - display 68
 - start an application in 80
 - stop an application in 80
- RPQs by protocol
 - 3705 EP/VS RPQs by protocol 200
- RTC tape
 - use by data collection 285
- RTT option table
 - changes 234
- run time
 - program residency determination 217
- run-time authorization
 - CINFC WRITE 278
 - common blocks 278
 - key 0 278

run-time authorization (*continued*)

- MONTC macro 278
- overview 278
- privileges 278
- storage protection key 278
- supervisor state 278

run-time macro restriction

- overview 17

S

SALO statement

- to code 218

sampling mode

- data collection 286

SCB ID

- TPF/APPC sessions 76

scratchpad area (SPA)

- initialize 78

secondary logical unit (SLU)

- description 251

- processing for TPF/APPC 76

secondary supervisor call (SVC)

- specify in supervisor call (SVC) tables 231

segment

- CLE5 168

- CMW0 168

- CMW3 168

selective dump address table

- relationship to SMDT 265

selective file dump (SFD)

- start 81

selective file dump and trace (SFDT)

- changes 234

- description 234

- start 83

- stop 83

selective memory dump facility (SMDF)

- control dump content 13

- overview 13

- selective memory dump table (SMDT)

 - changes 238

 - control dump content 9, 264

 - generate entries using the IDATG macro 237

 - IDATG calls 238

 - relationship to selective dump address table 265

- tailor dump content 13

self-modifying program

- program allocation 219

servers

- loosely coupled considerations 185

- overview 185

- system support 277

- tightly coupled considerations 185

- types 185

session control block (SCB)

- definition for TPF/APPC sessions 77

- display CCB information 75

- display for TPF/APPC sessions 78

- initialize for TPF/APPC sessions 78

- specify 76

session limit

- change 75

- initialize 75

- reset 75

set system mask (SSM)

- changes 229

- dynamic address translation (DAT) facility 231

- instruction 231

- program event recording (PER) facility 231

shared program

- location of demand counter 219

shutdown level

- changes 229, 251

- overview 312

- set 251

- set CPU loops 216

- set for communications 216

- set for non-SNA communication 258

SIP stage I

- FCTBG offline program 208

SIP stage I macro

- SSDEF 220

SNA communication

- 3-byte resource identifier (RID) 251

- change network addressable units (NAUs) 251

- changes

 - migration 251

 - system generation 251

 - TPF/APPC 251

- consolidate application program names 251

- convert network node names 251

- define SNA resources 226, 251, 252

- description 226, 251

- dynamic LU support 252

- generate SNA tables 251, 252

- generate the SNA tables 251

- logical unit (LU)

 - Logon Manager 251

 - naming conventions 226

- logon manager 251

- modify SNA network definitions 251, 254

- network definitions 251

- offline ACF/SNA table generation (OSTG) 226

- operating environment 197

- overview 18

- presentation services (PS) 251

- resource definitions 251

- secondary logical unit (SLU) 251

- set shutdown levels 251

- trace facilities 256

SNA control block

- create through a dynamic load 211

- initialize through a dynamic load 211

SNA data loader

- dynamic load 211

- fresh load 211

SNA I/O trace facility

- CTC devices 18

- debug 293, 303

- overview 10, 18, 293, 295, 303

- problem determination 293, 303

- SNA I/O trace facility (*continued*)
 - SNA communication trace facility 303
 - symbolic device address table (SDAT) 304
 - turn on and off 304
 - XID7 processing 18
- SNA I/O trace indicator bit
 - modify 304
 - symbolic device address table (SDAT) 304
- SNA I/O trace table
 - content 18, 303
 - display content online 304
 - modifications to make 18
 - SNA system error dumps 18
 - system error dump 304
- SNA resource address
 - convert 76
- SNA resource definition
 - resources
 - ALS 254
 - CDRM 254
 - CTC 254
 - LU 252
 - NCP 254
- SNA resources
 - ALS resources 252
 - CDRM resources 252
 - commands 252
 - convert resource address 76
 - CTC resources 252
 - define 251, 252
 - define using
 - dynamic loads 211
 - fresh loads 211
 - dynamic LU support 252
 - local applications 252
 - LU resources 252
 - NCP resources 252
- SNA segment
 - changes in residency 224
- SNA tables
 - adjacent link station (ALS) 252
 - changes 212, 218, 251
 - generate 251, 252
 - network address table (NAT) 252
 - process selection vector (PSV) name table 252
 - reserve storage 230
 - resource vector table (RVT) 252
 - size 251
 - subarea address table (SAT) 252
 - system recovery table (SRT) 252
- SNAPC data
 - online mini dump trace facility 294
- SNAPC macro call
 - changes 229, 237
 - content 246
- softcopy publications feature
 - overview 8
- software requirements
 - prerequisites for the TPF 4.1 system 196
- SQL trace table
 - display entries 82
- stage-initiated message
 - cancel 82
- standard core block
 - initialization 12
- statement
 - CONFIG 208
 - FCTBG 208
 - input statements 221, 222
 - ONLFIL 208
 - RAM 208
 - RAMFIL 204, 208
 - SSDEF 208
 - UFTFTI 204, 208
- static override bitmap table (SOBT)
 - changes 238
 - content 238
 - override 238
- storage
 - between ECBs 277
 - block types 278
 - contiguous storage 278, 307
 - direct access storage devices (DASD) 186
 - E-type programs 220
 - ECB virtual memory 307
 - get contiguous pieces in the heap private area 307
 - heap storage 13, 307
 - how to manipulate 309
 - key-protected storage 219
 - lock in programs 306
 - logical storage 213, 278
 - low storage 277
 - main storage 13, 203, 212, 213, 225, 277, 297
 - manipulation macros 309
 - overlay errors 277
 - physical storage 213
 - protected storage 277
 - real storage 209, 277
 - release 307
 - storage devices 186
 - storage protection key 277, 278
 - tape libraries 186
 - tape units 186
 - unlock programs 306
 - unprotected storage 219
 - use of streamlined 213
 - virtual file access (VFA) storage 249
 - virtual storage 213, 277, 297
 - working storage 13, 22, 212, 213, 214, 249, 278
- storage allocation
 - control program table allocation 262
 - modify online 262
 - overview 18
 - tape processing 262
 - valid keywords 262
- storage blocks
 - get and release 278
 - query the number of 312
- storage protection key
 - run-time authorization 278
- store keypoint copy
 - keypoint staging area 267

- structured query
 - display 81, 82
 - maintain 81, 82
- subarea address table (SAT)
 - changes 252
 - create 211
 - initialize 211
- subsystem
 - how to access the user (SSU) record 247
 - map RSC SSID/device addresses 65
 - use the index to access the FACE table
 - structure 247
 - users (SSUs)
 - alter SSU records 71
 - relationship with FARF 66
 - specify 284
- supervisor call (SVC)
 - add existing SVCs to the TPF system 231
 - add new SVCs to the TPF system 231
 - changes 229, 231
 - define 229, 231
 - display index in SVC table 69
 - display SVC code in hexadecimal 69
 - indexed 231
 - instruction definition 18, 19
 - migrate entries 231
 - overview 18, 19
 - secondary 231
 - specify 231
 - table
 - add existing SVCs to the TPF 4.1 system 231
 - add new SVCs to the TPF 4.1 system 231
 - changes 231
 - define 231
 - get SVC entry addresses 234
 - maintain 231
- symbolic device address table (SDAT)
 - SNA I/O trace facility 304
 - SNA I/O trace indicator bit
 - modify 304
 - SNA keypoint 304
- synchronous link control (SLC)
 - alter CCP restart/shutdown polling controls 72
 - start link trace 73
 - stop link trace 73
 - use 199, 258
- synchronous link lines
 - display status 72
 - start 73
 - stop 74
 - validate 74
- SYSEQ tag
 - TPF 4.1 system 59
- SYSTC bit
 - modify 262
- system activity
 - monitor 312
- system allocation
 - overview 17
 - process simplifications 223
- system allocator (SALO)
 - C run-time library 224
 - changes 217
 - create offline system allocator (SAL) table 203
 - create program allocation table (PAT) 203
 - criteria for running 224
 - how to run 224
 - overview 19
 - procedure to run SIP stage I 224
 - procedure to run SIP stage II 224
 - program
 - description 223
 - format of output 224
 - system allocation changes 223
 - table allocation changes 224
 - table
 - allocation information 19
 - changes 161, 227
 - create 217
 - generate by running the system allocator (SALO) 227
 - overview 19
 - produced by system allocator (SAL) 224
 - use by the TPF 4.1 system 224
 - tape
 - overview 19
- system availability
 - overview 13
- system clock
 - modification 82
 - system test vehicle (STV) 82
- system error
 - calls (SERRC)
 - migration 319
- dump
 - control content 19
 - SNA I/O trace table 304
- message address spaces 19
- options
 - override 263
 - specify 263
- overview 19, 264
- package
 - changes 229, 236
 - ECB virtual memory (EVM) 236
 - modify 236
 - system virtual memory (SVM) 236
- prefix numbers 19
- system storage areas 19
- system generation
 - changes 203, 216
 - generate the TPF 4.1 system 203
 - modify options 262
 - option values and settings
 - alter 82
 - CLEAR keyword 262
 - description 211
 - display 83
 - keyword 262
 - modify 262
 - TPFDF keyword 262

- system generation (*continued*)
 - option values and settings (*continued*)
 - VEQR keyword 262
 - SYSTC
 - changes 235
 - description 235
 - test 235
- system initialization
 - file address compute program (FACE) 19
 - overview 19
 - specify global area size 209
- system initialization program (SIP)
 - changes 204
 - display tape queue timeout value 65
 - overview 11
 - storage allocation values
 - alter 65
 - display 65
- system interprocessor communications facility (SICF)
 - support for 202
- system interprocessor global table (SIGT)
 - changes 212, 218
- system interprocessor information
 - alter for DASD IPC 81
 - display for DASD IPC 81
- system log trace facility
 - branch trace facility 10
 - debug 293, 298
 - enter/back trace facility 10, 293, 299
 - I/O trace facility 299
 - macro trace facility 293, 299
 - options
 - alter 82
 - branch trace 10
 - display 82
 - enter/back trace 10
 - I/O trace 10
 - online minidump 10
 - program event recording (PER) 10
 - real-time trace (RTT) 10
 - register and S/370 branch trace 10
 - SNA I/O trace 10
 - system trace log 10
 - turn on and off 272
 - types 20
 - ZSTRC command 272
 - overview 10, 295, 298, 299
 - problem determination 293
 - register and S/370 branch trace facility 293, 299
 - register trace facility 295, 299
 - SNA I/O trace facility 10, 293
 - system log trace facility 10, 293, 299
- vehicle (STV)
 - display 82
 - pause 82
 - start 82
 - stop 82
 - system clocks modification 82
- system macro call (SERRC)
 - migration 319
- system macro call (SERRC) (*continued*)
 - SERRC data
 - online mini dump trace facility 294
 - SERRC macro call
 - changes 229, 237
 - control dump content 237
 - default prefix 238
 - IBM reserved prefixes 238
 - service code 238
- system operating state
 - display 69
- system recovery
 - messages 274
- system recovery table (SRT)
 - changes 252
- system reduction reports
 - changes 288
 - data reduction 288
- system service request
 - macro decoders 19
 - overview 19
- system shutdown value
 - how to adjust the values 216
 - initial setting 216
 - types
 - common blocks 82
 - ECBs 82
 - frames 82
 - IOBs 82
 - SWBs 82
- system state
 - changes 231
- system status
 - display 82
- system support services
 - changes 277
 - overview 277
 - run-time authorization 278
 - shared storage between ECBs 277, 278
- system test compiler (STC)
 - modify pilot tapes for globals 215
- system utilities
 - capture and restore 277, 281
 - data collection 284
 - data reduction 284
 - database reorganization (DBR) 277, 283
 - real-time tape 277, 279
- system virtual memory
 - layout of 215
- system virtual memory (SVM)
 - address space 236
 - addresses in VEQR mode 297
 - control program services 236
 - convert addresses
 - EVM to SVM 236
 - SVM to EVM 236
 - display core 67
 - macro services 236
 - modify the system error package 236
 - storage layout 297

- system work blocks (SWBs)
 - allocate working storage 203
 - changes 214, 229, 233, 235
 - get and release 233, 278
 - non-DASD IOBs 278
 - set for CPU loop shutdown levels 216
 - system shutdown value 82
 - working storage relationship 214
- systems network architecture (SNA)
 - alter
 - communications keypoint 77
 - path (alternate to prime) 75
 - printer path (prime to alternate) 75
 - define 203
 - display communications keypoint 77
 - display resource statistics 77
 - display resource status 77
 - load definitions 81
 - load network definitions 77
 - polling resources
 - start 78
 - stop 78

T

- T5 node
 - channel-to-channel (CTC) connection 252
- table generation
 - ACF/SNA 8, 210
 - FACE 11
 - file address compute program (FACE) 204
- tables
 - adjacent link station (ALS) 252
 - CCP branch vector table (BVT) 259
 - chained table 17
 - channel control work (CCW) table 259
 - channel usage table 279
 - CINFC table 15
 - CLH block management table 237
 - CMMGLBTB table 234
 - command table 61
 - cross-subsystem services definition table (CGOT) 217
 - device control unit usage table 279
 - dump override table (DOT) 9, 21, 51, 71, 264
 - dynamic override bitmap table (DOBT) 238
 - ECB activation table 67
 - event table 11
 - file address compute program (FACE) table 11, 21, 54, 203, 212, 218, 242, 245, 246, 247
 - hash table 11, 17, 226
 - internal event facility table 233
 - macro decoder table 231
 - macro information table 231, 232
 - macro tables 232
 - main I-stream SVC table 160
 - network address table (NAT) 252
 - network command status table (NCST) 77
 - page and segment tables 278
 - path information unit (PIU) trace table 77, 78
 - process selection vector (PSV) name table 252

- tables (*continued*)
 - program allocation table (PAT) 11, 16, 19, 68, 203, 221, 224, 268, 287
 - program sharing table (PST) 16, 224
 - RCAT stop table 61
 - record hold table 17
 - record ID attribute table (RIAT) 12, 17, 81, 218, 284
 - resource resolution table (RRT) 210, 211
 - resource vector table (RVT) 78, 160, 211, 252, 287
 - routing control application table (RCAT) 68, 80
 - RTT option tables 234
 - secondary supervisor call (SVC) table 69
 - selective dump address table 265
 - selective memory dump table (SMDT) 9, 237, 238, 264
 - side information table 78
 - SNA I/O trace table 18, 303
 - SNA tables 18, 212, 218, 230, 251, 252
 - SQL trace table 82
 - static override bitmap table (SOBT) 238
 - subarea address table (SAT) 211, 252
 - supervisor call (SVC) table 231, 234
 - symbolic device address table (SDAT) 304
 - system allocator (SAL) table 19, 161, 203, 221, 224, 227
 - system interprocessor global table (SIGT) 212, 218
 - system recovery table (SRT) 252
 - system tables 237
 - tape status table 84
 - time-initiated message table 82
 - trace control table 18, 19, 234
 - universal format type (UFT)/format type indicator (FTI) conversion table 242, 243
 - user tables 230
 - VTAM interpret tables 253
- tape
 - alternate (ALT) 20
 - automatic mounting 69, 280
 - changes 280
 - device status
 - by logical control unit 83
 - modify 83
 - dismount 83
 - by logical control unit 83
 - display 83
 - dumps 261
 - group
 - assign a tape device 83
 - define for automatic tape mounting 83
 - delete for automatic tape mounting 83
 - display for automatic tape mounting 83
 - names 281
 - unassign a tape device 83
 - IOB changes 214
 - JDCD tape 285
 - label
 - assign to tape groups 83
 - maintenance 83
 - record initialization 83
 - load program data 83
 - lost interrupt detection 281

- tape (*continued*)
 - manual switch 83
 - mounting
 - active output tapes 83
 - automatic 8, 69, 83
 - capture and restore 281
 - define tape groups 83
 - delete tape groups 83
 - description 280
 - determine automatic tape mounting 281
 - display tape groups 83
 - lost interrupt detection 281
 - standby output tapes 83
 - multiple-volume tape dumps 261
 - overview 20
 - pilot tape 215, 251
 - processing
 - post processing 261
 - reconfiguration 84
 - remount 83
 - removal
 - for emergencies 83
 - initialize 83
 - rewind 83
 - RTC tape 285
 - stalled module queues 281
 - system allocator (SAL) tape 19
 - unload 83
- tape libraries
 - types 186
- tape units
 - types 186
- tape update utility
 - channel usage table 279
 - description 279
 - device control unit usage table 279
- TCP/IP communication
 - operating environment 198
- TDSPC
 - overview 20
- teleprocessor network simulator (TPNS)/emulator
 - program (EP)
 - simulator operation
 - start 73
 - stop 73
- terminal address table (WGTA)
 - display 70
 - modify 70
- terminal interchange (TI)
 - alter 73
 - display error count 72
 - display status 73
 - reset 73
 - support of
 - high-speed lines 72
 - low-speed lines 72
 - types 188
- terminals
 - types 189
- threshold
 - catastrophic processor failures 273
- threshold (*continued*)
 - change the fault rate for channel failures 273
 - change the fault rate for processor failures 273
 - channel failures 273
- time-initiated message
 - cancel 82
 - display table 82
 - initialize table 82
- timer rate
 - overview 20
- TOD synchronization compatability (TSC)
 - invalidate 74
 - validate 74
- tools
 - block checking mode 299
 - diagnostic 293
 - problem determination 293
- TPF 4.1 library
 - overview 315
- TPF 4.1 system
 - APPC macros 36
 - areas of the TPF 4.1 system 158
 - C language support functions 46
 - changed interfaces 23
 - CINFC tags 56
 - commands 62
 - CONKC tags 59
 - data macros 37
 - general macros 28
 - general use C language header files 49
 - new interfaces 23
 - obsolete interfaces 23
 - offline messages 84
 - online messages 84
 - PTV macros 37
 - SIP macros and statements 24
 - SNA communication macros 37
 - start the first time 216
 - SYSEQ tags 59
 - system equates 59
 - system errors 84
 - system macros 28
 - user exits 51
- TPF Application Requester (TPFAR)
 - define new record ID 208
 - overview 7
- TPF Database Facility (TPPDF)
 - overview 20
 - software requirements 201
 - structured programming macros (SPMs) 18
 - TPPDF keyword 262
- TPF Migration Guide: Program Update Tapes
 - migration aid 15
- TPF/APPC sessions
 - consolidate application program names 203
 - CPI communications 20
 - display PIU trace table 77
 - overview 20
 - processing of a PLU 76
 - processing of a SLU 76
 - remote LU 76

- TPF/APPC sessions (*continued*)
 - resource name 76
 - session control block (SCB)
 - definition 77
 - display 78
 - ID 76
 - initialize 78
- trace buffer
 - 4 KB common block 234
 - written to tape 234
- trace control table
 - changes 234
- trace facility
 - branch trace facility 10
 - CP TRACE facility 301
 - enter/back trace facility 10, 293
 - macro trace facility 234, 293
 - path information unit (PIU) trace facility 256, 293, 301
 - program event recording (PER) trace facility 293
 - register and S/370 branch trace facility 10, 293
 - SNA communication 256
 - SNA I/O trace facility 10, 293, 303
 - system log trace facility 10, 293, 298
 - system traces 293
 - systems network architecture (SNA) I/O 293
- trace table
 - description 18
- traces
 - branch trace 10
 - enter/back trace facility 10
 - I/O trace 10
 - real-time trace 10
 - register trace 10
 - system trace 10
- transaction protection
 - changes 213
- transfer vector
 - allocate 217, 221
 - definition 221
 - format of input statements for allocation 221
- tuning
 - virtual file access (VFA) 241
 - virtual file access (VFA) candidates 248
 - virtual file access (VFA) indicators 249
 - virtual file access (VFA) resources 248

U

- UDATB macro
 - use to provide IDATG calls to selective memory dump table (SMDT) 238
- UFTFTI statement
 - parameters 205
- unit record device
 - types 187
- universal file type (UFT)
 - description 205
 - FARF4 structure 243
 - FARF5 structure 243
 - format indicator (FTI) 205

- universal file type (UFT) (*continued*)
 - range 243
 - record ordinal number size limit 243
 - suggestions for use 243
- universal format type (UFT)/format type indicator (FTI)
 - conversion table
 - description 243
 - location of FARF4 and FARF5 addresses 242
- unprotected program
 - location of the demand counter 219
- unprotected storage
 - description 219
- unsolicited message
 - send to consoles 81
 - send to logical units (LUs) 81
- user table
 - reserve storage 230
- utilities
 - data set overview 10
 - PIUPRT 256
 - SNA I/O trace facility 303

V

- V-type constant (VCON)
 - changes 227
- VALBC macro
 - validate block addresses 310
- VEQR keyword 262
- virtual address
 - convert to real addresses for use by CCWs 230
- virtual file access (VFA)
 - buffer
 - allocation for the VFA reserve chain 249
 - flush 249
 - use for DASD file operations 249
 - buffer allocation for the VFA reserve chain 249
 - buffers 249
 - candidate
 - access most recent copy 247
 - access processor unique record 247
 - performance monitoring facility 248
 - tune 248
 - changes 214, 248
 - counters maintained 285
 - data format 285
 - define resources 84
 - description 248
 - display resources 84
 - flush records 249
 - indicate measurements 84
 - indicators 249
 - interface from exception recording to VFA 249
 - locate residents 84
 - offline performance monitoring facility 248
 - online performance monitoring facility 248
 - overview 22
 - purge records 249
 - reserve chain
 - size 249

- virtual file access (VFA) *(continued)*
 - resources
 - performance monitoring facility 248
 - tune 248
 - size 214
 - start 84
 - stop 84
 - storage
 - allocate 249
 - tune 241, 249
 - VFA candidate options 216
- virtual storage
 - description 213
 - layout 213, 297
 - layout of 215
- virtual-equals-real (VEQR) mode
 - addressing 297
 - change to VEQR mode 296
 - convert from a nonvirtual to a virtual system 296
 - EVM addresses. 297
 - functions 296
 - how it works 297
 - migration testing 296
 - operating mode for testing 296
 - overview 293, 296
 - performance impacts 296
 - production environment use 296
 - run E-type programs 296
 - start 298
 - start and stop 298
 - stop 298
 - SVM addresses 297
 - turn off 298
 - turn on 298
 - turn on and off 298
 - ZSTRC command 295
- volume serial number (VSN)
 - alter 64
 - changes to naming scheme 212
 - command
 - ZAVSN 64
 - ZDVSN 70
 - display 70
 - overview 274
- VTAM interpret tables
 - definition 253

W

- working storage
 - 16-MB constraint relief 22, 212
 - allocate 214, 249
 - change values online 214
 - changes 212, 307
 - content 214
 - control program macros 278
 - data integrity 213
 - dynamic address translation (DAT) facility 22
 - ECB limit 307
 - get 307
 - heap storage 13

- working storage *(continued)*
 - manage 278
 - overview 22
 - release 307
 - transaction protection 213
 - view 22
- WTOPC
 - availability to the system 228
 - changes 230
 - overview 22
 - paging control 22
- WTOPC macro 22

X

- X'18' displacement
 - changes 229, 235
 - description 235
 - subtraction
 - overview 235
 - stop between object code and listings 229
 - stop from re-assembled code 229

Z

- ZFMSG facility
 - command characteristics
 - change 22
 - define 22
 - overview 22
- ZMPIF command 202



File Number: S370/30XX-34
Program Number: 5748-T14



Printed in the United States of America
on recycled paper containing 10%
recovered post-consumer fiber.

GH31-0186-01

