TO: MSPM Distribution
FROM: M. Padlipsky
SUBJECT: BTABLE
DATE: 11/30/67

Sections BL.7.01 - .03 are obsolete and should be discarded; new entries for these numbers now appear in the Table of Contents.

Note that Section BY.2.05 has been renumbered, to BY.17.01.
# Table of Contents

**11/30/67**

## BA. Introduction and General Information
1. General
2. Summary of Multics Technical Policy 07/23/65
3. MSPM Conventions 05/19/66
4. Flexowriter Specifications for Multics Documentation 09/09/66

## BB. Standards and Conventions
1. Glossary
2. System Module Interfaces (PL/I Subset for System Programming) 06/24/66
3. Standard Media Formats
   - 01 Standard Tape Formats 06/02/67
   - 02 Multics Card Punch Codes 03/30/67
4. Segment Structure
5. External Name Registry
   - 00 Multics Name Registry 05/08/67
   - 01 Reserved Segment Name Suffixes 11/02/66
   - 02 Reserved External Symbols 03/30/67
   - 03 Software Simulated Faults 06/07/67
   - 04 Reserved Option Names 05/09/67
   - 05 Fault Assignments 02/15/67
   - 06 Segment Name Registry 01/07/67
   - 07 Reserved Stream Names 11/01/66
   - 08 Reserved Condition Names 07/26/67
   - 08A Addendum, BB.5.08 08/04/67
6. Standard Programming Practice
   - 01 645 Multics Standard Checksum Procedure 06/02/67

## BC. Hardware
1. Equipment Configuration for Multics Operation
   - 00 Overview of Equipment Configuration Documentation
   - 01 Minimum Configurations and Configuration Restrictions 11/25/66
   - 02 Major Module Port Assignment 11/25/66
   - 03 Memory Port Selection and Interface Settings
   - 04 Interrupt Cell Assignment 12/06/66
BC. 2. Character Input/Output

00 Introduction 04/14/67
01 Character Set 11/08/66
02 Interpretation of ASCII Character Streams 08/11/66
03 Erase and Kill Conventions 08/12/66
04 Character Escape Conventions 02/24/67
05 Requirements for DIM Specifications 01/02/66

3. Hardware Deficiencies

00 Purpose of Hardware Deficiency Documentation 03/08/66
01 Processor Tag 03/08/66
02 Calendar Clock
03 Processor Execution Timer Interrupt 10/02/67
04 System Controller Addressing
05 (Blank)
06 Operation-not-complete Fault
07 Magnetic Tape Channels
08 GE Hollerith Character Set Interfaces

4. GIOC Conventions

01 System Initialization and Bootload 06/30/67

BD. Miscellaneous Supervisor Services

1. The Segment Symbol Table

00 Standard Format for the Segment Symbol Table 02/17/67
01 (Blank)
02 The Segment Symbol Table produced by the PL/I Translator 02/21/67
02A Additions to PL/I Segment Symbol Table 06/15/67
03 The Segment Symbol Table Produced by EPLBSA

2. Segment Binding

01 Binding Information and Format 08/25/66

3. Segment Management

00 Segment Management Module Overview 04/05/67
01 The Segment Name Table 05/04/67
02 Segment Management Module Primitives 05/05/67

4. The Search Module

00 Search Module Overview 03/24/67
01 Search Module Driver
02 Search Module Interpreter
5. Monitoring

6. System Definition
   .01 Multics System Definition
   .02 System Skeleton
   .03 Hard-Core Supervisor Entry Points
   .04 Resource Management Library
   .05 Multics Command and Subroutine Library
   .06 Local Command and Subroutine Library
   .07 Community Library
   .08 System Processes
   .09 Process Directories
   .10 Process-Group Directories
   .11 The Segment "process_info"

7. Intersegment Linkage
   .00 Overview
   .01 Linkage Section
   .01A Appendix to BD.7,01
   .02 Call, Save; Return; Slave
   .03 Call, Save, Return; MM and EO
   .03A Erratum, BD.7,03
   .04 Link_fault

8. (Blank)

9. Supervisor Protection
   .00 Overview of Supervisor Protection
   .01 Wall Crossing: The Gatekeeper
   .01A Corrigenda, BD.9,01
   .02 Outward Call Argument Management
   .03 Inward Call Argument Validation
   .04 Condition Handling in Multics
   .04A Corrigenda, BD.9,04
   .05 Abnormal Returns: The Unwinder
   .06 Get_ring_no
   .07 Hard-Core Supervisor Callout Mechanism

10. Clocks
    .01 Clock Services provided by the Supervisor
    .02 System Time Conversion Procedure
    .03 Calendar Clock Wakeup Management
    .04 Basic Execution Meter
    .05 Execution Meter Coordinator

11. Mail
### MULTICS SYSTEM-PROGRAMMERS' MANUAL SECTION BTABLE PAGE 4

**BE. Development Tools**

1. **The Use and Maintenance of EPL in CTSS**
   - .01 Use of the EPL compiler in CTSS 11/04/67
   - .02 Processing EPL "macros" with EPLMAC 11/16/67
   - .03 Print the three files created by an EPL Compilation (old BN.3.03) 07/13/66
   - .04 EPL Compilations on CTSS FIB (old BN.3.05) 07/05/66

2. **The Use and Maintenance of EPL in the Pre-Multics System**

3. **645 Segment Dump**

4. **Development Tools Segment Library**

5. **6.36 System**
   - .00 Overview of the 6.36 System 02/08/66
   - .01 Introduction to GECOS 02/10/66
   - .02 Merge-editor 10/27/67
   - .03 Error Message Generator 02/18/66
   - .04 6.36 Dumper 06/14/66
   - .05 GIOC Interface Module Debugging Aids 05/05/67
   - .06 GEBUG 03/02/66
   - .06A Addendum to BE.5.06 05/22/67
   - .07 EDA 12/09/66
   - .08 Character Escape Conventions for IBM 026 Keypunches 12/28/66
   - .09 Operators Guide to the 6.36 System (old BE.5.05) 10/22/65
   - .10 Print ASCII File 03/11/66
   - .11 RQASCII 06/23/66
   - .12 Special Segment Generation 03/31/67
   - .13 JOIN SAVED 03/30/67
   - .14 Print Out Links in Text and Link File 11/17/67

6. **64.5 System**
   - .00 Overview of the 64.5 System 08/16/66
   - .01 64.5 Driver 09/07/66
   - .02 Dumper 03/10/66
   - .03 Operators Guide to the 64.5 System 09/27/66
   - .04 Source Cards to CTSS

7. **Pre-Multics System**
   - .00 Overview of the Pre-Multics System 06/09/67
   - .01 Initializer 03/02/66
   - .02 Interim Tape Writer
   - .03 EPL Symbol Table Pseudo-Operations
   - .04 Use and Maintenance of EPLBSA in the Pre-Multics System
   - .05 Packer 03/02/66
   - .06 Marker 02/25/66
   - .07 Loader 12/09/66
   - .07A Appendix to BE.7.07 07/21/67
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Simulator</td>
<td>03/09/66</td>
</tr>
<tr>
<td>7.08</td>
<td>Appendix to BE.7.08</td>
<td>05/18/67</td>
</tr>
<tr>
<td>7.09</td>
<td>Operators Guide to the Assembly and Simulation System</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>645 Simulator Escape</td>
<td>11/02/66</td>
</tr>
<tr>
<td>11</td>
<td>645 Segment Library Editor</td>
<td>10/25/66</td>
</tr>
<tr>
<td>12</td>
<td>Execution Environment for 645 Pseudo-Process</td>
<td>02/07/67</td>
</tr>
<tr>
<td>13</td>
<td>Use of GIOC in a 645 Pseudo-Process</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pseudo-supervisor</td>
<td></td>
</tr>
<tr>
<td>8.00</td>
<td>Overview</td>
<td>10/13/66</td>
</tr>
<tr>
<td>8.01</td>
<td>Linker</td>
<td>10/13/66</td>
</tr>
<tr>
<td>8.02</td>
<td>Page Management</td>
<td>10/13/66</td>
</tr>
<tr>
<td>8.03</td>
<td>Segment Management</td>
<td>10/13/66</td>
</tr>
<tr>
<td>8.04</td>
<td>Linkage Building</td>
<td>10/13/66</td>
</tr>
<tr>
<td>8.05</td>
<td>Pseudo Process Initialization</td>
<td>07/24/67</td>
</tr>
<tr>
<td>9</td>
<td>Use of the Multics Linker</td>
<td>06/05/67</td>
</tr>
<tr>
<td>10</td>
<td>Pseudo-file System</td>
<td></td>
</tr>
<tr>
<td>10.01</td>
<td>Elementary File System</td>
<td>06/10/66</td>
</tr>
<tr>
<td>10.02</td>
<td>Elementary File System Print Routines</td>
<td>06/30/66</td>
</tr>
<tr>
<td>10.03</td>
<td>Foreign Files</td>
<td>06/28/66</td>
</tr>
<tr>
<td>11</td>
<td>On-line Character Stream I/O</td>
<td>12/21/66</td>
</tr>
<tr>
<td>12</td>
<td>Run Time Debugging Aids</td>
<td></td>
</tr>
<tr>
<td>12.01</td>
<td>Trace and Dump for EPL Procedures</td>
<td>04/08/66</td>
</tr>
<tr>
<td>12.02</td>
<td>Strace: A Subroutine Tracing Procedure for 6.36</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>GE 645 Core Memory X-Ray Program</td>
<td>11/22/66</td>
</tr>
<tr>
<td>14</td>
<td>Interim File Loader Dumper</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>System Tape Generator</td>
<td></td>
</tr>
<tr>
<td>15.01</td>
<td>Multics Bootload Simulator (MBS)</td>
<td>02/28/67</td>
</tr>
<tr>
<td>BF</td>
<td>I/O Control System</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Overview of the I/O System</td>
<td>12/28/66</td>
</tr>
<tr>
<td>1</td>
<td>User Interface Module</td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>Overview of I/O System User Calls</td>
<td>08/14/67</td>
</tr>
<tr>
<td>1.01</td>
<td>Attachment and Detachment of Input/Output Devices and Pseudodevices</td>
<td>09/19/66</td>
</tr>
<tr>
<td>1.02</td>
<td>I/O System Modes and Device-Mode Relationships</td>
<td>04/21/67</td>
</tr>
<tr>
<td>1.03</td>
<td>The Attachment Graph</td>
<td></td>
</tr>
<tr>
<td>1.04</td>
<td>Input/Output System Synchronization Modes</td>
<td>03/01/67</td>
</tr>
<tr>
<td>1.05</td>
<td>Code Conversion</td>
<td>08/14/67</td>
</tr>
<tr>
<td>1.06</td>
<td>Device Format Specification</td>
<td></td>
</tr>
<tr>
<td>1.07</td>
<td>Basic I/O System Orders</td>
<td></td>
</tr>
<tr>
<td>1.08</td>
<td>I/O Path Tracing</td>
<td></td>
</tr>
<tr>
<td>1.09</td>
<td>I/O System Alteration</td>
<td></td>
</tr>
</tbody>
</table>
Frames, Items, and the Current Item...

Linear Frames
Sequential Linear I/O
Random Linear I/O
Logical Record Frames
Sequential Logical Record I/O
Random Logical Record I/O
Handling Logical Records as Linear Frames
Frames with Complex Structure
Representation of Data on Detachable Media
Advanced Input and Deferred Output
I/O Status Returns
I/O System Callout Mechanism
Default I/O Exception Handling

I/O System Internal Structure

Summary of Initial I/O System
Device Manager Flow-of-Control
The I/O Status Update Dispatcher
Internal Synchronization Management
Overview of the Switching Complex
The I/O Switch
The Not-Founder
The Attachment Table Maintainer
The Type-Table Maintainer
The Entry-Point Vector Maker
Internal Description of the I/O Callout Mechanism
The Status Allocator
The I/O Process-Jumper
Data Base and Transaction Block Discipline
The I/O Registry
The Attachment
The Working-Process
The Dispatcher
The I/O Device Assignment Module
I/O System Mode

Overview of the Registry Files

(Blank)
4. File System I/O
   .01 The File System Interface Module
   .02 Multi-Segment Files
   .03 The Segment Interface Module

5. Unit Record Device I/O
   .01 Overview of Line Printer Output 01/13/67
   .02 The Line Printer Driver
   .03 The Pseudoprinter DIM
   .04 The Printer Interface Module 01/13/67
   .05 (Blank)
   .06 The Interim PRT202 DIM 08/07/67
   .07 (Blank)
   .08 Overview of Card Reader I/O
   .09 (Blank)
   .10 (Blank)
   .11 (Blank)
   .12 (Blank)
   .13 (Blank)
   .14 (Blank)
   .15 (Blank)
   .16 Overview of Card Punch I/O

6. Overview of Tape I/O
   .01 (Blank)
   .02 Standard Tape Device Control Module 07/26/67
   .03 (Blank)
   .04 (Blank)
   .05 (Blank)
   .06 (Blank)
   .07 (Blank)
   .08 (Blank)
   .09 (Blank)
   .10 (Blank)

7. Overview of Datadisc I/O
8. The Logical Record Formatter
9. (Blank)

10. Input-Output Code Conversion
    .00 An Overview of Input-Output Code Conversion 08/07/67
    .01 Input Code Conversion 08/14/67
Errors detected by the GIOC Interface Module 07/12/67
Generation of the Class Driving Tables using the I/O Table Compiler 08/04/67
Generation and Usage of the Change List Structures using the I/O Command Translator 08/03/67
Internal Structure of the IOCT and IOTC 08/03/67
GIM - Basic Concepts 07/19/67
GIM - Setup and Housekeeping 07/19/67
GIM - List Editing and Activation 07/19/67
GIM - Interrupt Handling and Status Requests 07/19/67
GIM - Miscellaneous 07/19/67

The Basic File System

0. Overview of the Basic File System 12/13/66
1. The Known Segment Table 01/17/67
2. The System Segment Tables 03/04/67
3. Segment Control
   a. Introduction to Segment Control 05/19/67
   b. The System Interface Module 05/24/67
   c. The User Interface Module 05/24/67
   d. The Process Load Module 05/24/67
   e. The Segment Utility Module 05/24/67
   f. Ring Register Simulation 05/25/67
4. Page Control 06/03/66
5. The Core Map 06/07/67
6. Core Control
   a. Core Control 06/07/67
   b. The Cartologer 06/06/66
   c. The Allocator 06/06/66
   d. The Replenisher 06/07/67
   e. The Contiguator 06/07/67
   f. The Ranker 06/07/67
   g. The Parametizers 06/07/67
7. The Directory Data Base
   a. Directory Data Base 08/04/67
8. Directory Control
   a. Directory Control (Summary) 01/27/67
   b. Directory Maintainer 07/14/67
   c. Directory Supervisor 07/14/67
   d. Errata, BG.8.02 08/04/67
   e. Directory Supervisor, Special User Primitives 07/14/67
BG. 8 .04 Directory Supervisor, System
    Primitives 07/14/67
    .04A Errata, BG.8.04 08/04/67
9. Access Control 12/28/66
10. File System Device Interface Modules 06/27/66
    .00 DIM Overview (old BG.15)
    .01 The I/O Queues
    .02 The DIM Driver
    .03 DIM Control
    .04 The Request Initiator
    .05 The Read Module
    .06 The Write Module
    .07 The Truncate Module
    .08 The Cleanup Module
    .09 DIM History Management
    .10 Device Dependent Modules
11. The Drum Interface Module 12/20/66
    .01 Free Storage Management
    .02 I/O Command Management
    .03 Drum Queue Management
12. The Disc Interface Module
13. The Race Interface Module
14. Summary of Calls within the Basic File System
15. Interlocking and Blocking in the
    Basic File System 05/27/66
    .00 Locking and Blocking (Summary) (old BG.18.00)
    .01 The Process Wait and Notify Module (old BG.18.01)
    .02 Interlocking Routines (old BG.18.02) 06/08/66
16. File System Conventions
17. Service Routines
    .01 Drum Utility Module 09/27/67

BH. The Backup and Multilevel System 08/18/66
0. Summary of the Backup and Multilevel System
1. Multilevel Storage Management 10/31/66
    .01 Move Control Module
    .02 Multilevel Storage Monitor 10/28/66
    .03 Retrieval Process
    .04 Consolidation Process
2. Dumping Processes
    .00 Summary of the Dumping Processes 12/23/66
2. Incremental Dump Decision Module 12/16/66
   System Checkpoint Dump Decision Modules 12/16/66
   User Checkpoint Dump Decision Module 12/16/66
   Single Segment Dumper

3. Reloading Processes
   The Hierarchy Reconstruction Process 12/23/66
   The Secondary Storage Reload Process 12/23/66

4. Detachable Storage I/O
   The Dumping I/O Process 01/06/67
   The Reload I/O Process 01/04/67
   Tape Formats For Backup 01/12/67

BJ. The Traffic Controller

0. Overview of Traffic Control 02/23/67

1. Traffic controller data bases
   Overview of Traffic Controller Data Bases 08/03/67
   The Active Process Table 07/20/67
   The Ready List 07/19/67
   Process Data Segment 11/03/67
   Process Data Block 11/03/67
   Process Concealed Stack 11/03/67
   Process Definitions Segment 11/03/67
   Process Definitions Block 11/03/67

2. Process Control
   Overview of Process Creation and Activation (Old BJ.1.00) 02/20/67
   Process Creation and Deletion
   Process Control and Deactivation

3. Process Exchange
   Overview 12/07/66
   Block 11/30/66
   Wakeup 11/30/66
   Quit 11/30/66
   Restart 11/25/66

4. Processor Scheduling and Dispatching
   Overview of Scheduling and Dispatching 01/30/67
   The Scheduler
   The Dispatcher (getwork) 02/06/67
   The Initial Scheduler 07/19/67
   The Initial Dispatcher
   The Initial Ready List 07/19/67
5. Process Switching
   .00 Overview of Process Switching 03/20/67
   .01 Swap_dbr 03/24/67
   .02 Ready-him 03/24/67
   .03 Process Bootstrap Module
       (Old BJ.5.02) 09/27/66
   .04 LDBR Procedure 03/23/67
   .05 Subroutine Overlay 03/24/67
   .06 Process Templates
6. Coordination of Traffic Controller Modules
7. Miscellaneous Utility Modules
   .01 Traffic Control Interlock
   .02 APT-Hash Table 07/19/67
   .03 Process Id Generator 06/16/67
8. Process Creation
   .01 Create_proc 11/03/67
   .02 Estbl_proc 11/03/67
   .03 Create_linker_segs 11/03/67
   .04 Create_hardcore_segs 11/03/67
   .05 Copy_seg 11/03/67
   .06 Create_linker_segs (initial)
9. Process Initialization
   .01 Init_proc 11/03/67
   .02 Pre_Tinker_driver 11/13/67
   .03 Gate_init 11/10/67
   .04 Init_admin
   .05 Init_ipc
   .06 Init_switch
   .07 Pre_Tinker Driving Table Manager

0. Overview of Processor Management 10/13/66
1. Processor Management Tables
   .01 Processor Data Segment 06/02/66
   .02 Processor Data Block 03/10/67
   .03 The Processor Stack 06/02/66
   .04 Fault and Interrupt Vector 07/20/67
2. Interrupts
   .01 Overview of Interrupt Handling 11/10/66
   .02 Interrupt Interceptor 01/31/67
   .03 Drum Interrupt Handler 01/23/67
   .04 GIOC Interrupt Handler 05/08/67
   .05 Calendar Clock Interrupt Handler 01/23/67
   .06 Process Interrupt Handler 08/24/67
3. Faults
   .01 Overview of Fault Handling 10/02/67
   .02 Process/System Fault Breakdown 10/02/67
   .03 The Fault Interceptor 09/29/67
   .04 Catastrophe Module
MULTICS SYSTEM-PROGRAMMERS’ MANUAL  SECTION BTABLE  PAGE 13

BK. 3  .05 (Blank)
.06 Page/Segments Fault Handler  10/02/67
.07 Timer Runout Fault Handler  09/13/66
.08 Connect Fault Handler  09/13/66
.09 Catalog of GE645 Addressing
Reference Faults  11/17/67

4. System Hardware Control
.00 Overview of System Hardware Control
.01 System Communication Segment
   (Old BK.1.04)  10/02/67
.02 Controller Addressing Segment  09/27/67
.03 Clock Addressing Segment  11/20/67
.04 Major Module Configuration Table  11/15/67

5. Master Mode Hardware Control Routines
.00 Overview - Master Mode Utility
   Segment  10/31/67
.01 Interrupt Mask Procedure  06/15/67
.01A Appendix to BK.5.01  06/28/67
.02 Connect Procedure  09/28/67
.03 Set alarm Procedure  09/29/67
.04 Set cell Procedure  10/02/67
.05 Connect Generator Procedure  10/02/67
.06 Stack Switching Module:
   switch_stack  11/17/67

BL. System Initialization
0. Overview of System Initialization  04/28/67
1. Multics System Tape
   .01 Format  03/21/67
   .02 Contents
   .03 Multics System Tape Generator  09/28/67
   .04 System File Directory
2. Segment Loading Table
   .01 Segment Loading Table  03/29/67
   .02 Segment Loading Table Manager  04/10/67
3. System Configuration Table
   .01 Major Module Configuration Table
      Initializer  11/03/67
   .02 System Communication Segment
      Initializer  09/28/67
   .03 Initialization Constants
4. Bootstrap Initializer
   .00 Bootstrap Initializer--Overview  03/25/67
   .01 Bootstrap Initializer--Part 1  03/24/67
   .02 Bootstrap Initializer--Part 2  03/27/67
BL. 5. Multics Initializer
   .00 Overview of Multics Initializer 04/28/67
   .01 Initializer Control Program 05/01/67
   .02 Fault Handling during Initialization 05/26/67
   .03 Interrupt Handling during Initialization 06/15/67
   .04 Process Exchange during Initialization 06/30/67
   .05 RSW - Reading Processor Data Switches 11/17/67
   .06 Fault-Interrupt Utility for Initialization 11/17/67
6. .01 Segment Loader 03/17/67
    .02 Tape Reader
    .03 Core Control Initializer 10/02/67
7. Initialization Linkage
   .00 Pre-linking
   .01 Pre_link_1
   .02 Pre_link_2
   .03 DBI - Initialization Datmk
8. I/O System Initialization 08/17/67
9. Fault and Interrupt Initialization
   .01 Fault Initializer 04/10/67
   .02 Interrupt Initializer 05/10/67
10. File System Initialization
    .00 File System Initialization (Introduction) 04/21/67
        .01 Part 1 04/24/67
        .02 Part 2 04/24/67
        .03 Part 3 04/24/67
        .04 File System Device Configuration Table 04/27/67
11. Traffic Controller Initialization 04/24/67
    .01 tc_init
    .02 prds_init
BM. System Operation
1. Overview
2. System Operator Actions
   .01 System Operator Actions
   .02 System Operator Responsibility
3. Operation of Detachable Devices
   .01 Detachable Device Registry
   .02 Detachable Device Operator
4. System Logs
   .01 On-line Log
   .02 System Operation Log
   .03 User Log 10/04/67
BN. The EPL Compiler

0. Overview
   00 EPL Compiler Documentation 06/21/67

1. Use and Maintenance of EPL in Multics

2. Pass 1
   01 Program Description
   02 Descriptor of Macro Calls Produced by Pass 1 01/26/67

3. Pass 2
   01 Program Description
   02 Description of EPLBSA Code Produced by Pass 2 02/24/67

4. TMG and TMGL
   00 TMG Overview 03/07/67
   01 How to Create and Use a TMGL Compiler 02/24/67
   02 TMGL 04/17/67
   02A Index and Errata for BN.4.02 05/12/67

5. Global Strategies in EPL
   00 Overview of Global Strategies 03/04/67
   01 Implementation of EPL Blocks 03/07/67
   02 Implementation of on-Conditions in EPL 06/02/67

6. Local Strategies in EPL
   00 Overview of Local Strategies
   01 Overall Program Organization 03/09/67
   02 Declarations and Data Organization
   03 Expression Evaluation
   04 The begin, procedure, and entry Statements 05/08/67
   05 The do Statement 05/19/67
   06 The if Statement 05/18/67
   07 The on, signal, and revert Statements
   08 Miscellaneous Statements (allocate, call, free, goto, and assignment)
BN. 7. The EPL Run-Time Library

The EPL Run-Time Library

dope_ 04/27/67
varst_ 03/08/67
synep_ 03/07/67
bool_ 06/01/67
substr_ 03/04/67
trap_ 03/04/67
hbound_, lboun__ 03/04/67
datmk_ 09/29/67
stgop_ (Supersedes BN.7.04 dated 03/11/67) 06/01/67
movstr_ 06/01/67
Erratum for BN.7.10 08/04/67
andstr_ 06/01/67
Erratum for BN.7.11 08/04/67
strcmp_ 06/01/67
Erratum for BN.7.12 08/04/67
index_ 06/01/67
Erratum for BN.7.13 08/04/67
catstr_ 06/01/67
Erratum for BN.7.14 08/04/67
size 08/17/67

8. EPLBSA (Old BE.7.04)

9. Efficient Use of EPL

A Programmer's Guide to Efficient Use of EPL 05/05/67
The Efficient Accessing of Data 05/05/67
Appendix to Section BN.9.01 05/05/67
Conditions that Necessitate Dope 05/05/67

BO. Resource Usage Accounting and Administration

0. Overview of Resource Usage Accounting and Administration (old BO.2.00) 10/10/66

1. Resource Expenditure Metering

Overview of Metering (old BO.3.00) 10/28/66
Processor Usage Metering (old BO.3.01) 10/31/66
Core Residence Metering (old BO.3.02) 12/07/66
File System I/O Traffic
General I/O Traffic
Dedicated Resource Use 02/20/67
Secondary Storage Residence (old BO.3.06) 10/21/66
Active Meter Table

2. Accounting Data Collection

Update_Accounting
The Account Data Segment
The Page-Accounting System Process
The Secondary-Storage-Accounting System Process
BC. 3. Pricing and Operating Policy
   .01 System Pricing Routines
   .02 Signon
   .03 Out_of_Funds
   .04 Account Status
   .05 Transfer_Funds
   .06 Pool Files
   .07 The Accounting-Transactor Interface

4. Billing and Administration
   .01 Billing Procedure
   .02 Auditor
   .03 External Accounting
   .04 Allocate_Resources
   .05 Administrative Records

5. Transfers of Resource Allotments
   .00 Overview
   .01 Resource Transfer Procedure

6. Accounting Adjustments
   .00 Overview
   .01 Complaint Frame
   .02 Complaint Collection Procedure
   .03 Complaint Adjustment Procedures

7. Auditing Trails

BP. Specifications for the Multics PL/I Compiler

0. Multics PL/I Compiler: General Specifications
   .00 Summary of Multics PL/I Compiler Specifications 11/22/66
   .01 PL/I Implementation Dependent definitions 11/08/66
   .02 Changes to the PL/I Language 11/09/66
   .03 Special Built-In Functions 11/16/66
   .03A Correction to PL/I Built-in Clock Function 11/17/67
   .04 Multics Subroutine Calls Useful to the PL/I Compiler

1. Dictionary of Run Time Routines

2. Data Representation and Referencing
   .01 Data Representation 11/10/66
   .02 Accessing, Specifiers, and Dope 11/10/66

3. Blocks and Internal Procedures
   .00 Implementation of PL/I Blocks 06/16/67
   .01 Synthetic Epilogue Procedure for PL/I

4. Storage Classes and Management
   .00 Implementation of PL/I Storage Classes 11/17/66
   .01 Data Segment Grower (datmk_) 11/17/66
   .02 Procedures for Dynamic Storage Management 11/18/66
BP. 5. On Condition Handling
   .00 Handling of On-Conditions
   .01 Standard Trap Cells
   .02 Standard Fault Cells (Overflow, Divide Check, Null Pointer)
   .03 Programmer Defined Conditions

6. String Manipulation
   .01 PL/I String Operations
   .02 The Substr Built-In Function and Pseudo-Variable

7. Input-Output
8. Math Library
9. Miscellaneous PL/I Statements

BQ. System Control
0. Overview of System Control
1. System Processes
   .01 System Control Procedure
   .02 List of System Processes
   .03 Phase one System Control Procedure

2. User Control
   .00 Overview and Terminology
   .01 Answering Service Procedure
   .02 Communications Line Management Module
   .03 User Control Processes
   .04 Absentee Monitor Process

3. User Process Groups
   .00 Overview
   .01 Overseer Procedure
   .02 Absentee User Process Groups
   .03 Stop Procedure
   .04 Start Procedure
   .05 Save and Resume

4. User Identification Data Bases
   .00 Overview
   .00A Appendix to BQ.4.00
   .01 Dedicated Console List
   .01A Changes, BQ.4.01
   .02 Personnel List
   .02A Changes, BQ.4.02
   .03 User Profile

5. System Load Control
   .01 Process Group Ranking
   .02 Ranking Policy
   .03 Load Control Module
## Section BQ. Interprocess Communication

<table>
<thead>
<tr>
<th>Section</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>.00 Overview of Communication</td>
<td>07/20/67</td>
</tr>
<tr>
<td>.00A Addendum to the Interprocess Communication Facility</td>
<td>11/15/67</td>
</tr>
<tr>
<td>.01 How to use the Interprocess Communication Facility</td>
<td>07/21/67</td>
</tr>
<tr>
<td>.02 Summary of Calls to Interprocess Communication</td>
<td>07/21/67</td>
</tr>
<tr>
<td>.03 Events and Event Channels</td>
<td>07/24/67</td>
</tr>
<tr>
<td>.04 Event Channel Manager</td>
<td>07/27/67</td>
</tr>
<tr>
<td>.05 Interprocess Group Event Channel Manager</td>
<td>07/25/67</td>
</tr>
<tr>
<td>.06 Wait Coordinator</td>
<td>07/27/67</td>
</tr>
<tr>
<td>.07 Device Signal Table Manager</td>
<td>07/27/67</td>
</tr>
<tr>
<td>.08 The give-call facility</td>
<td>08/07/67</td>
</tr>
<tr>
<td>.09 Event Channel Manager Primitives and Channel Access Techniques</td>
<td>10/05/67</td>
</tr>
<tr>
<td>.10 Interprocess Communication Utility Package</td>
<td></td>
</tr>
</tbody>
</table>

## Section BR. The Test and Diagnostic System

<table>
<thead>
<tr>
<th>Section</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>0. Overview</td>
<td></td>
</tr>
<tr>
<td>.00 Overview of Test and Diagnostic Documentation</td>
<td>11/25/66</td>
</tr>
<tr>
<td>.01 Test and Diagnostic Philosophy</td>
<td>12/06/66</td>
</tr>
<tr>
<td>1. The Initial Test and Diagnostic System</td>
<td></td>
</tr>
<tr>
<td>.00 Overview of Off-Line Test and Diagnostic System</td>
<td>11/30/66</td>
</tr>
<tr>
<td>2. On-Line Test and Diagnostic Operation</td>
<td></td>
</tr>
<tr>
<td>.00 Overview of On-Line Test and Diagnostic Operation</td>
<td>12/06/66</td>
</tr>
<tr>
<td>3. Built-in Diagnosis Tools</td>
<td></td>
</tr>
<tr>
<td>.01 Hardcore Ring Unrecoverable Condition Handler</td>
<td></td>
</tr>
<tr>
<td>4. General Hardware Debugger</td>
<td></td>
</tr>
<tr>
<td>.00 General Hardware Debugger Overview</td>
<td></td>
</tr>
<tr>
<td>.01 Segment Selection and Creation</td>
<td></td>
</tr>
<tr>
<td>.02 Segment Editing and Display</td>
<td></td>
</tr>
<tr>
<td>.03 Program Activation and Control</td>
<td></td>
</tr>
<tr>
<td>.04 Fault Interception and Handling</td>
<td></td>
</tr>
<tr>
<td>.05 Special Topics</td>
<td></td>
</tr>
</tbody>
</table>
BT. Dedicated Resource Management
0. Overview of Management
1. Resource Assignment
   .00 Overview of Assignment
   .01 Assigner
   .02 Permission Files
   .03 Assignment Log
2. Detachable Media Management
   .00 Overview of Management
   .01 Media Manager
   .02 Media Status Tables
3. Reservations
   .00 Overview of the Reserver
   .01 Summary of Reserver Calls
   .02 Reserver Implementation Plan
4. Dedication of Shared Resources
   .01 Multilevel Storage
   .02 Control of Response Quality
   .03 I/O Channel Capacity
   .04 Shared Resource Usage Prediction

BX. Commands
0. Philosophy and Standards
   .00 Overview: Use of Commands in Multics
   .01 Standards for Command Writing
1. Multics Command Language
   .00 Multics Command Language
   .00A Appendix for BX.1.00
2. The Listener and the Shell
   .00 The Shell
   .01 Shell Punctuation Characters
   .02 Listener Procedure
3. User Process Control
   .01 Login, Prolog
   .02 Password
   .03 Subsystem
   .04 Logout
   .05 Save, Resume
   .06 Quit
   .07 Absentee
   .08 Change Login ID
   .09 Quit_absentee
   .10 Continue
   .11 Abort
Multics System-Programmers Manual

5. EPLBSA
   .00 EPLBSA Overview
   .01 EPLBSA Expressions and Literals
   .02 EPLBSA Pseudo-operations
   .03 EPLBSA Machine Operations
   .04 EPLBSA Multiple Location Counters and Multi-Segment Assembly 09/08/67
   .05 EPLBSA Under the Environment of Multics

6. FORTRAN IV

7. FL/I

8. File System Commands
   .00 Overview 01/27/67
   .00A Errata to BX.8.00 11/17/67
   .01 List 12/09/66
   .02 Access Control Modification 04/10/67
   .02A Appendix for BX.8.02 04/27/67
   .03 Listac1 04/07/67
   .04 Link 06/01/67
   .05 Make_dir, Make_branch 12/21/66
   .06 Rename, Addname, Delname 12/08/66
   .07 Delete 06/01/67
   .08 Truncate
   .09 Move_entry 12/13/66
   .10 Move_file
   .11 Map_dir 05/11/67
   .12 Working Directory Table Commands
   .13 Relate, Unrelate

9. File Printing and Editing
   .01 Context Editor 08/03/66
   .02 Printing a File in ASCII or Octal 02/18/66
   .03 Request

10. Debugging Aids, General
    .00 Interactive Debugging Aids 06/07/66
    .01 Probe 06/07/66
    .02 Tracer 06/07/66
    .03 Breaker 06/07/66
    .04 Monitor 06/07/66

11. Documentation
    .01 (Blank)
    .02 Describe
    .03 Mail
    .04 Get_mail
12. System Options
   .00 The Use of Options in Multics 01/18/67
   .01 Representation of Options 01/26/67
   .02 Option, Delopt, Printopt 01/23/67

13. Using the Search Module
   .00 User Search Control 01/18/67
   .01 Search Module Vocabulary 01/26/67
   .02 Checkrule
   .03 Enforce

14. Segment Binding
   .01 The Binder 12/28/66
   .02 Elimination of Intra-Segment Links in Bound Segments 11/08/67

15. Operator Commands
   .01 Answering Service
   .02 Media

16. Reservation Commands

17. Using GECOS Programs in Multics
   .00 Using GECOS programs in Multics 08/24/67
   .01 GECOS segment loader for Multics 08/24/67
   .02 GECOS master-mode entry simulator 08/25/67
   .03 Using GMAP in Multics
   .04 Using the GECOS version of FORTRAN IV in Multics

18. Command Language Macros
   .00 Overview 11/08/67
   .01 Macro Processor 11/08/67
   .02 Macro Command 11/08/67
   .03 Macro_arg, Create Control Commands 11/08/67
   .04 Iterate Control Command
   .05 Conditional Control Command
   .06 SetValue, Value Control Commands
   .07 Include, End_Include Control Commands
   .08 Concatenate Control Command

19. System Maintenance Commands

BY. Library
0. Standards for System Library Procedures 01/06/67
1. Standard Math Routines
2. File System Routines
   .00 Overview 01/25/67
   .01 File System Interface 03/28/67
   .02 Decode Basic File System Error Code 10/03/67
   .03 Deltree 04/03/67
   .04 Preparation of Path Names and Entry Names Acceptable to the File System 11/10/67
   .05 (Blank)
2. Mapleve1 pel
03/31/67
04/14/67
11/17/67
11/17/67
06/23/67
11/10/67
11/17/67
11/17/67
10/27/67
09/28/66
01/13/67
09/30/66
10/07/66
10/11/66
09/28/66
11/25/66
11/25/66
01/06/67
01/06/67
01/06/67
01/06/67
01/06/67
12/08/66
09/28/66
10/27/67
01/16/67
12/08/66
01/16/67
10/11/66
09/28/66
11/25/66
09/28/66
09/28/66
01/06/67
01/06/67
01/06/67
01/06/67
01/06/67
01/06/67
01/06/67
01/06/67
01/06/67
BY. 10. Extensions to PL/I
   .01 "Entry Variables" in PL/I 09/28/66
   .02 Length Functions for PL/I Strings 06/23/67
   .03 Production of the Non-Varying Equivalent of a String 06/23/67

11. Error Handling Routines
   .00 Overview 05/26/67
   .01 Seterr 05/26/67
   .01A Appendix to BY.11.01 06/30/67
   .02 Geterr 05/26/67
   .03 Delerr 05/26/67
   .04 Printerr 05/26/67
   .05 Unclaimed_signal 08/07/67

12. Supervisor Service Procedures
   .01 Who_called 08/21/67
   .02 Get_level, set_level 07/18/67
   .03 Signal 07/18/67
   .04 Condition 07/18/67
   .04A Addendum, BY.12.04 08/04/67
   .05 Reversion 07/18/67
   .06 Unwinder 07/18/67
   .07 Get_ring_no 07/19/67
   .08 Find condition 07/19/67
   .09 Validate_arg 07/19/67
   .10 Get_sp

13. Linkage Segment Maintenance Procedures
   .00 Overview 11/09/67
   .01 Forcing a Link 11/09/67
   .02 Generate_ptr 11/09/67
   .03 Link_change 11/03/67
   .04 Remove Definition

14. Relative Pointer Manipulation Procedures 01/06/67
15. System Utility Procedures
   .01 Generating Unique Identifiers 11/17/67
   .02 Time Conversion 05/03/67
   .03 Formatted Time Conversion 05/03/67
16. Storage Management Procedures
   .01 allocate_, freen_, areamk_
17. Procedures to Return Directory Path Names
   .01 Return Working Directory Path Name (Old BY.2.05) 11/17/67
   .02 Return Process Directory Path Name 11/17/67
   .03 Return Process-Group Directory Path Name 11/17/67
   .04 Return Library Directory Path Name
18. Procedures to Return System Information
   .01 Return Process Id 11/17/67
   .02 Return Process-Group Id 11/17/67
<table>
<thead>
<tr>
<th>Old Number</th>
<th>(Date)</th>
<th>New Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE.5.05</td>
<td>10/22/65</td>
<td>BE.5.09</td>
</tr>
<tr>
<td>BG.18.00</td>
<td>05/27/66</td>
<td>BG.15.00</td>
</tr>
<tr>
<td>BG.18.01</td>
<td>06/05/66</td>
<td>BG.15.01</td>
</tr>
<tr>
<td>BG.18.02</td>
<td>06/08/66</td>
<td>BG.15.02</td>
</tr>
<tr>
<td>BG.15</td>
<td>06/27/66</td>
<td>BG.10.00</td>
</tr>
<tr>
<td>BN.3.03</td>
<td>07/13/66</td>
<td>BE.1.03</td>
</tr>
<tr>
<td>BN.3.05</td>
<td>07/05/66</td>
<td>BE.1.04</td>
</tr>
<tr>
<td>B0.2</td>
<td>10/10/66</td>
<td>B0.0</td>
</tr>
<tr>
<td>B0.3.00</td>
<td>10/28/66</td>
<td>B0.1.00</td>
</tr>
<tr>
<td>B0.3.01</td>
<td>10/31/66</td>
<td>B0.1.01</td>
</tr>
<tr>
<td>B0.3.02</td>
<td>12/07/66</td>
<td>B0.1.02</td>
</tr>
<tr>
<td>B0.3.06</td>
<td>10/21/66</td>
<td>B0.1.06</td>
</tr>
<tr>
<td>BJ.5.02</td>
<td>09/27/67</td>
<td>BJ.5.03</td>
</tr>
<tr>
<td>BY.3.01</td>
<td>03/31/67</td>
<td>BY.4.02</td>
</tr>
<tr>
<td>BQ.6.01</td>
<td>03/13/67</td>
<td>BQ.6.02</td>
</tr>
<tr>
<td>BJ.1.00</td>
<td>02/20/67</td>
<td>BJ.2.00</td>
</tr>
<tr>
<td>BE.7.04</td>
<td>03/01/66</td>
<td>BN.8</td>
</tr>
<tr>
<td>BY.2.02</td>
<td>04/14/67</td>
<td>BY.2.08</td>
</tr>
<tr>
<td>BY.2.05*</td>
<td>03/04/67</td>
<td>BY.17.01</td>
</tr>
</tbody>
</table>

(* changes since last issue dated 10/31/67)