RT-11
Documentation Directory
Order No. DEC-11-ORDDA-A-D

ABSTRACT

This document lists and describes the software manuals for the RT-11 Operating System, Version 2C (V2C), including the Monitor, system programs, FORTRAN, and BASIC.

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DDT         LAB-8          TYPESET-10
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TABLES

Table 1 RT-11 Documentation
1.0 INTRODUCTION

This directory describes the software documents associated with the RT-11 Operating System, Version 2C (V2C). The user unfamiliar with RT-11 should read this document in its entirety to ascertain recommended reading; those familiar with RT-11 can use this directory as a reference to the contents of individual manuals.

For the purpose of this directory, the RT-11 Operating System is assumed to include the FORTRAN and BASIC languages in addition to the RT-11 Monitor and system programs. A list of manuals describing optional RT-11 software is included at the end of this directory (Section 2.10).

The following documents are described in this directory:

<table>
<thead>
<tr>
<th>Document</th>
<th>V2C Order Number</th>
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<tbody>
<tr>
<td>RT-11 FORTRAN Release Notes</td>
<td>DEC-11-LFRNA-A-D</td>
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<tr>
<td>RT-11 System Reference Manual</td>
<td>DEC-11-ORUGA-C-D, DN1, DN2</td>
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<td>RT-11 System Reference Card</td>
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<td>PDP-11 FORTRAN Language Reference Manual</td>
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<tr>
<td>BASIC/RT-11 Language Reference Manual</td>
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</table>

Table 1 lists the RT-11 manuals and indicates the intended audience for each manual according to the following categories:

**Beginning RT-11 user**

Knows computers and software fundamentals; probably familiar with a higher-level language; may or may not be familiar with PDP-11 assembly language; unfamiliar with RT-11 operating procedures.

**System manager**

Responsible for generating and maintaining RT-11 at the user site; familiar with RT-11 operating procedures.

**Assembly-language programmer**

Familiar with PDP-11 instruction set or an assembly language such as MACRO; may or may not be familiar with RT-11 operating procedures.
FORTRAN programmer

Familiar with PDP-11 FORTRAN or other FORTRAN language; may or may not be familiar with RT-11 operating procedures.

BASIC programmer

Familiar with PDP-11 BASIC or other BASIC language; may or may not be familiar with RT-11 operating procedures.

Because RT-11 is a small single-user system, a given user may fall into one or more of the above categories. For example, almost every assembly-language programmer also serves from time to time as system manager; the above categories are intended only to serve as a guide for locating information of a particular type.

Table 1
RT-11 Documentation

<table>
<thead>
<tr>
<th>Document</th>
<th>Beginning RT-11 User</th>
<th>System Manager</th>
<th>Assembly Language Programmer</th>
<th>FORTRAN Programmer</th>
<th>BASIC Programmer</th>
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3
2.0 DESCRIPTIONS OF DOCUMENTS

The following sections describe the manuals listed in Table 1 at the end of Section 1.0. For each manual, the following information is provided:

- title
- brief description
- intended audience
- contents by chapter


Written for the system manager or system-level programmer responsible for the generation and installation of RT-11, the Release Notes provide up-to-date information on the current releases of the RT-11 Monitor and system programs, FORTRAN, and BASIC.

The appropriate Release Notes should be read completely before generating the RT-11 system to be used. During system generation, the Notes should be used in conjunction with the RT-11 System Generation Manual (see Section 2.2).

The first section of each Release Notes document describes the differences between the current version of the software (RT-11, FORTRAN, or BASIC) and the previous release(s). Subsequent sections describe known problems present in the distributed software, with corrective patches supplied where known.

2.2 RT-11 System Generation Manual

The RT-11 System Generation Manual is intended for use by the system manager or system-level programmer responsible for generating and installing RT-11 at the user site. The manual, used with the appropriate Release Notes document(s) (see Section 2.1), provides all information necessary to customize, generate, and exercise the RT-11 Monitor, system programs, FORTRAN, and BASIC.

Chapter 1 describes the contents of the RT-11 software kits. Chapter 2 provides step-by-step procedures for building the Monitor, system programs, FORTRAN, and BASIC from the kits. Chapter 3 describes simple demonstration programs that can be run after the generation process is complete. Chapter 4 provides software customizing information for users with nonstandard hardware configurations. Chapter 5 contains instructions for assembling (or compiling) and linking RT-11 source files.

2.3 RT-11 System Reference Manual

The largest and most comprehensive manual in the RT-11 set, the RT-11 System Reference Manual describes the features and operation of the RT-11 Monitor and system programs for all RT-11 users, from beginners to assembly-language system programmers.
Chapter 1 discusses system hardware and software requirements. It describes general system operations, and lists specific components available under RT-ll.

Chapter 2 introduces system conventions and monitor/memory layout. It describes in detail the keyboard commands for controlling jobs and implementing user programs.

Chapters 3 through 8 describe the following system utility programs, respectively:

- EDIT text editor
- PIP file transfer program
- MACRO assembler
- LINK linker
- LIBR librarian
- ODT debugging program

These programs enable the user to create text files and produce executable programs.

Chapter 9 is of particular interest to the experienced RT-ll assembly-language programmer. It describes programmed requests, system macros that allow the user to invoke system monitor services from within assembly-language programs.

Chapters 10 and 11 describe the 8K Assembler and EXPAND programs. These programs are useful at installations with minimum memory configurations.

Chapter 12 describes the RT-ll BATCH command language. In BATCH mode, the RT-ll system can be left to run unattended for long periods of time.

The appendices summarize the contents of the manual and describe additional system utility programs and routines that can be used for extended system operations. These programs include:

- SRCCOM source and text file comparison program
- FILEX file translation program (RT-ll to/from other DIGITAL operating systems)
- PATCH patch program for memory image files
- PATCHO patch program for object modules
- DUMP file dump program
- SYSLIB library of FORTRAN functions and subroutines that perform RT-ll programmed requests
2.4 RT-11 System Message Manual

The RT-11 System Message Manual, aimed at all RT-11 users, describes error diagnostics and informational messages issued by the RT-11 Monitor, system programs, FORTRAN, and BASIC.

The first section of the manual describes "hard errors" (those caused by write-locked or otherwise unusable hardware), and discusses the probable causes of those errors.

Next, system failures are described. Specific locations where the monitors may halt, and the reasons for the halts, are mentioned, along with a discussion of system and program looping.

The third section provides information on how to increase both memory and device storage space when insufficient room presents a problem for a particular operation.

The final section of the manual lists all messages issuable by system software. Messages are listed in alphabetical order; associated with each message is the issuing software component, the probable cause, and the recommended remedial action (if any) to rectify the error.

It is suggested that the System Message Manual be placed in a handy location near the computer for quick reference.

2.5 RT-11 System Reference Card

The RT-11 System Reference Card provides a handy pocket-sized reference for all RT-11 users. It summarizes selected error messages, as well as the command format and syntax for all RT-11 software components.

The Reference Card contains (in the order listed) the following information:

- SYS.COM (system communication area) Locations
- Permanent Device Names
- Assumed File Extensions
- Special Function Key Commands
- Keyboard Monitor Commands and Error Messages
- General Command String Format
- Commands and Selected Error Messages for:
  
  EDIT
  PIP
  LINK
  ODT
  LIBR
  DUMP
2.6 RT-11 Software Support Manual

The RT-11 Software Support Manual is for experienced PDP-11 programmers; it provides detailed information on the internal structure of RT-11. The user completely familiar with the RT-11 System Reference Manual (see Section 2.3) can use the Software Support Manual to gain a more intimate knowledge of the system software.

Chapter 1 gives an overview of the internal workings of RT-11. Chapter 2 describes monitor structure and table layout. Chapter 3 provides a complete description of RT-11 file structures. Chapter 4 is a detailed discussion of the structure and contents of the system device. Chapter 5 describes the input/output system, I/O queues, and device handlers (including information on writing and installing new handlers). Chapter 6 describes the Foreground/Background (F/B) Monitor. Chapter 7 provides details of BATCH operation. The appendices contain listings and examples of device handlers and other system components, as well as complete flowcharts of the Single-Job and Foreground/Background monitors.

2.7 PDP-11 FORTRAN Language Reference Manual

The PDP-11 FORTRAN Language Reference Manual describes the elements of the FORTRAN language as implemented on several PDP-11 software systems. Because the manual contains no system-dependent information, it must be used in conjunction with a system-specific user's guide; the RT-11 supplement is the RT-11/RSTS/E FORTRAN IV User's Guide (see Section 2.8).

Chapter 1 of the manual provides a language overview defining the elements of the FORTRAN language and the structure of a FORTRAN program. Chapter 2 describes the components of a FORTRAN statement (e.g., constants, variables, arrays, and expressions). Chapters 3 through 7 describe assignment, control, input/output, format, and specification statements, respectively. Chapter 8 describes subprograms, both those that are user-written and those provided in the FORTRAN library. The appendices provide reference information, including character codes, a language summary, and coding examples.
2.8 RT-11/RSTS/E FORTRAN IV User's Guide

This document is for the FORTRAN programmer familiar with the language elements described in the PDP-11 FORTRAN Language Reference Manual (see Section 2.7). It provides the information necessary to compile, link, execute, and debug a FORTRAN program under RT-11.

Chapter 1 describes the operating procedures for compiling, linking, executing, and debugging a FORTRAN program. Chapter 2 provides information about the Object-Time System (OTS), including register usage, the Traceback feature, and memory organization. Chapter 3 describes FORTRAN characteristics specific to RT-11. Chapter 4 provides programming suggestions for increasing the efficiency of FORTRAN programs. The appendices contain reference information such as data formats, library subroutine summaries, error diagnostics, and compatibility considerations.

2.9 BASIC/RT-11 Language Reference Manual

The BASIC/RT-11 Language Reference Manual is aimed at users who wish to write a BASIC program to execute under RT-11. The manual serves two purposes: it describes the elements of the BASIC language as implemented under RT-11, and it explains operating procedures for running a BASIC program under RT-11.

Chapter 1 is an introduction that describes briefly how to load and run a BASIC program. Chapters 2 through 7 constitute a description of the BASIC language, as follows: Chapter 2 describes BASIC arithmetic, including numbers, variables, subscripting, expressions, and arithmetic operations. Chapter 3 discusses BASIC strings, string variables, and string operations. Chapter 4 describes Immediate Mode operations. Chapter 5 describes the BASIC language statements. Chapter 6 discusses arithmetic functions, string functions, and user-defined functions. Chapter 7 describes the editing commands available with BASIC. Chapter 8 provides instructions for using assembly-language routines with a BASIC program. Chapter 9 lists error messages. Chapter 10 illustrates sample BASIC/RT-11 demonstration programs. The appendices provide reference information such as bootstrap procedures, the ASCII character set, command summaries, a memory map, and sample listings.

2.10 Optional RT-11 Software Documentation

The following documents describe optional RT-11 software components; the documents are provided as part of the software kit for each component.


PDL Operator's Guide (Order No. DEC-11-OPUGA-B-D) and PDL-11 Installation Manual (Order No. EK-PDL11-IN-001) -- describe the operation and installation of the PDL (Programmable Data Logger) hardware/software system. The PDL system acquires data from clinical laboratory instruments, makes mathematical calculations, and produces reports.

GAMMA-11 Foreground/Background System Reference Manual (Order No. DEC-11-MCFBA-A-D) and Command Summary for GAMMA-11 P/B (Order No. DEC-11-MCGSA-A-D) -- describe the operation, use, and installation of the GAMMA-11 P/B system, designed for acquisition and analysis of gamma camera data.

NOTE: This form is for document comments only. Problems with software should be reported on a Software Problem Report (SPR) form.

Did you find errors in this manual? If so, specify by page.


Did you find this manual understandable, usable, and well-organized? Please make suggestions for improvement.


Is there sufficient documentation on associated system programs required for use of the software described in this manual? If not, what material is missing and where should it be placed?


Please indicate the type of user/reader that you most nearly represent.

☐ Assembly language programmer
☐ Higher-level language programmer
☐ Occasional programmer (experienced)
☐ User with little programming experience
☐ Student programmer
☐ Non-programmer interested in computer concepts and capabilities

Name_________________________ Date____________________
Organization_____________________
Street_________________________
City___________________________ State_________ Zip Code_________
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Country

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