Software Product Description

PRODUCT NAME: RSTS/E, Version 9.2 **SPD 13.01.29**

DESCRIPTION

RSTS/E is a multiuser, general purpose timesharing system. Its uses include interactive timesharing, batch processing, indirect command file processing, program development using a variety of languages and tools, and a wide variety of special purpose applications. Up to 127 concurrent terminal users in both local and remote locations, through multiterminal services, can interact with application tasks. Without multiterminal services there can be a maximum of 63 users. Tasks can share computational, storage, and input/output services provided by the RSTS/E system.

The RSTS/E system is comprised of the RSTS/E monitor, device drivers, Commonly Used System Programs (CUSPs) and standard software components. Some of the major features of RSTS/E include:

- Interactive timesharing
- Dynamic allocation of system resources
- DCL (Digital Command Language)
- DCL command file processing
- CCL system manager defined command interface
- System security features
- User and job privileges and resource quotas allocated to accounts as required
- Batch services using DCL command files
- Print services using DCL
- Extensive file processing including file sharing, protection mechanisms, and virtual (memory) disk support
- Integrated system and account management using DCL
- Magnetic tape processing (single or multi-volume)
- Terminal handler designed for interactive environments
- Shared common code
- Software-maintained cache of frequently-accessed disk data
- Intertask communication
- Disk file and device backup and restore utilities with streaming support for streaming tape drives supported by RSTS/E
- System reliability and maintainability features
- DCL, RT-11, RSX, and BASIC-PLUS run-time system support
- Program Development Tools

Programs can be written in any of several languages. The following languages are included on RSTS/E systems:

- BASIC-PLUS
- MACRO-11 assembly language (RT-11 and RSX-11)

The following is a partial list of languages which are optionally available for use on RSTS/E. Refer to the RSTS/E Optional Software Cross Reference Table (SPD 20.97.xx) for a complete list of layered products supported by RSTS/E:

- PDP-11 BASIC-PLUS-2 for RSTS/E
- COBOL-81/RSTS/E
- PDP-11 COBOL
- RSTS/E DIBOL
- FORTRAN IV/RSTS/E
- PDP-11 FORTRAN-77/RSTS/E
- PDP-11 RPG II

BASIC-PLUS-2, COBOL-81, and PDP-11 COBOL require the support of the Record Management Services (RMS) software that is included with all RSTS/E systems. The optional DATATRIEVE-11 data management software also uses RMS. The use of RMS is optional for DIBOL-11, FORTRAN-77, and MACRO-11 assembly language programs. BASIC-PLUS and FORTRAN-IV do not use RMS.

Tools are available to facilitate the design, incorporation and maintenance of forms into applications. The Forms Management System (FMS) and INDENT are optionally available for the design, use and maintenance of interactive forms.

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Other utilities which are included as a standard part of the RSTS/E system are:

- EDT, DIGITAL's standard text editor
- PDP-11 SORT/MERGE, DIGITAL's powerful file sort utility and subroutine package
- RMS-11, DIGITAL's standard Record Management System

Timesharing

Each user of a RSTS/E system is associated with a job on the system and normally interacts with that job by using a terminal. Jobs can also run detached (not using a terminal) or they can use pseudo keyboards. Although a RSTS/E system is limited to 63 jobs, some RSTS/E systems can support as many as 127 terminal users simultaneously. These limits (63 jobs and 127 multiple terminals) are not always achievable. Jobs such as Error Logger, Queue Manager, and batch jobs also affect the maximum limits.

Dynamic Allocation of System Resources

RSTS/E schedules CPU time and memory residency among jobs based upon their priority and processing requirements. Jobs are rescheduled based upon time-slicing or as a result of waiting for system services. A round-robin algorithm is used to select among eligible jobs with the same priority. Job priorities can be altered by any user or program with the required privileges.

RSTS/E uses the memory management hardware capabilities to map a user's job area and any shared code into the user job's virtual address space. Jobs can be swapped out to disk storage when the memory is needed for other jobs to run. A job's size can be expanded dynamically, subject to limits imposed by a user with the required privileges. For machines which do not support separate instruction and data (I&D) space the absolute limit for a job size is 64K bytes (32K words). For machines which do support separate I&D space the absolute limit is 128K bytes (64K words). To take advantage of separate I&D space, programs can be written in RSX MACRO-11 or several of the high level languages. BASIC-PLUS programs cannot be larger than 32K bytes (16K words). For RT-11, MACRO-11 and FORTRAN IV the maximum is 28K words.

User-Command Languages

User-commands to the RSTS/E system are handled and interpreted by one of the run-time systems capable of acting as a keyboard monitor.

The Keyboard Monitors which are included as standard components of RSTS/E are DCL, RSX, RT-11, and BASIC-PLUS. All of these interpret sets of system commands, that is, English-like words followed by optional command parameters. These system commands allow users to perform all the fundamental functions required to use the RSTS/E system, such as logging on and off, copying files, and running programs. BASIC-PLUS and RT-11 have additional commands to perform actions appropriate for those environments.

Digital Command Language (DCL)

DCL is based upon the DCL available on most DIGITAL operating systems. In particular, it is similar to the DCL implemented on VAX/VMS. In addition to fundamental operations such as listing directories and copying files, DCL includes features such as user defined command synomyms, string and numeric symbol substitution, reading and writing files, system and account management functions, setting passwords, submitting to batch, setting terminal characteristics, and terminal activity logging. DCL is required as the system default keyboard monitor. DCL need not be memory resident unless a user is accessing it.

DCL command file processing is an extension of the DCL keyboard monitor. A DCL command file is a collection of DCL commands in a file. Conceptually, the commands in the file appear to the system as a series of commands which are presented to DCL from the keyboard. All command file processing is done within DCL so that no additional keyboards or job slots are required. Parameters can be passed to the command file processor at the time the file is invoked. DCL command files are considered to be executable and can be "run" or "chained to" as programs or can be invoked with the DCL "@" commmand.

In addition to standard DCL commands, the command file processor interprets a set of specialized commands that allow operations such as conditional branching, local and global symbols using 32 bit integers and 255 character strings, special purpose DCL Functions, error handling, "Control C" trapping, up to 13 nesting levels, selective display, optional time stamping and user prompting.

DCL command files are used to start up the system and set up system, group and individual user environments through the use of command files which are executed as the user logs into the system.

A comprehensive set of help frames explaining the operation of most DCL commands is available using the "HELP" command. This information is also available in the documentation which is provided as part of the RSTS/E product.

Concise Command Language (CCL)

The CCL feature allows each installation's system manager to define additional system-wide commands to run system utilities as well as other user programs. Each CCL command definition specifies the full form of the command and its abbreviation.

Security and Privilege

Access to the system is controlled by the use of passwords which can be 6 to 14 characters in length. Initial assignment of passwords is done by the system manager. Each user, given the required privilege, can change the password assigned to his/her account. Passwords are normally stored in hashed form. This feature is available on a per account basis at the option of the system manager.

The system manager may optionally define a system password which must be entered before the user is prompted to login to an account. This feature is available for different classes of access such as dial-up or network access.

As a resource sharing system, RSTS/E can give every user access to the system peripherals and resources, as well as a wide range of additional capabilities. Usage restrictions can be imposed on a per user or per system basis on some of these resources.

RSTS/E provides 34 separate privilege attributes which can be assigned to any account on the system. Tasks which are resident on the system may require one or more of these attributes in order to run. The system manager can then restrict the privileges an account has to those required by the users of the account. There is no connection between the numbers which designate accounts (PPNs) and the privileges assigned to the account.

Print/Batch Services

Batch jobs are a collection of DCL commands in a file which are placed (submitted) on a queue for execution. Batch services process each job in the queue in turn. Users can submit batch jobs to perform tasks that require no terminal interaction, or to run programs at a later time. For each batch job, the user can set limits on the system resources allocated to the job. Multiple queues can be defined. Each queue can have different attributes. Queues which are assigned to physical printers can be set up with a variety of attributes related to the form and quantity of output. A user with the required privilege can start up and control batch queues.

The following capabilities are not provided through Print/Batch Services but continue to be available through the use of OPSER utilities provided with the RSTS/E system.

- RJ2780 support
- Operator logging
- Operator request processing

Both print/batch services and OPSER line printer spooling packages support keyboard spooling to hard copy terminals, such as receive-only printers. Note however, that data integrity is not checked on the serial line.

File System

Disk files can be created, updated, extended, deleted, and renamed under program control, or they can be created, deleted, and renamed using terminal commands. Files can be created and extended dynamically with the RSTS/E file system automatically allocating disk space wherever available. Alternatively, to enhance system performance, a file's location can be specified and/or a file can be preallocated to use physically contiguous space. A disk file's size is limited by the storage capacity of the volume on which it resides. One file cannot extend across multiple disk volumes.

Files can be accessed by multiple users simultaneously. When opened for shared update, multiple users can update the same file while it remains open. The file system's block interlock mechanism can be used to prevent different users from updating the same part of the file concurrently.

RSTS/E disk volumes, when used as file-structured devices, are either public or private. A public volume is the system disk or any volume initialized and mounted as a public volume. Other file-structured volumes are private. Files cannot span volumes. Access to a disk file is governed by its protection code, which specifies read and write access for the file's owner, for users within the owner's group, and for all users. For executable files, the protection code specifies execute and read/write access for owner, group, and all users on the system.

A utility (FIT) provides file transfer capabilities to and from volumes (including RX01/RX02 floppy diskettes) using RT-11 file structure and DOS (read-only) media. This is limited to disks up to 33.5 million bytes in storage capacity. A separate utility handles interchange of files on RX01/RX02 flexible diskettes using the IBM 3741 single density format (Format 1). With this utility EBCDIC to ASCII translation is a user-specifiable option.

For systems with memory in excess of the amount required during the normal operation of the RSTS/E system, RSTS/E supports a "Virtual" or memory resident disk. This disk appears no different to the user than any other disk, however, since it is actually an allocated block of memory, I/O to the virtual disk operates at memory speeds. This disk can be used for most of the same purposes that a physical disk can but can be especially effective for use in storing commonly accessed read-only user files or system files.

Account Management

DCL commands are provided to create and delete accounts, set account attributes, and display account information. Account templates can be created and used to set the defaults for a class of accounts.

Several different types of accounts can be defined. User accounts allow access to the RSTS/E system. Captive accounts cause the system to startup a specific application such as word processing or a menu. When the user leaves the application the job is killed and the user is logged off. Guest accounts can be set up causing the system not to prompt for the password for the account during login. Accounts can be designated as non-interactive, causing the system not to allow a user to login.

Accounts have privileges associated with them. The privilege attributes assigned to an account determine what a user logged into the account can do on the system.

Accounts can be set up with an expiration date. After the expiration date has passed, users can no longer login to the account. The account is not automatically deleted.

Magnetic Tape Processing

RSTS/E can be instructed to read and write tapes of a specific density such as 800, 1600, or 6250 BPI if the density is supported by the controller for the tape drive. Alternatively, the user can specify that either the minimum or maximum density supported by the controller be selected automatically.

Supported tape formats are DOS-11 and ANSI. DOS-11 format is used for interchange between PDP-11 and VAX systems running RSTS/E, RT-11, RSX-11M, RSX-11M-PLUS, IAS, and VAX/VMS.

ANSI format is used for interchange with the above systems as well as other computer systems. RSTS/E implements a subset of the ANSI format, defined by American National Standard Institute Specification X3.27-1978, which is used for interchange between systems that support the standard. When using ANSI labelling format, RSTS/E processes only volume-header, file-header, end-of-file, and end-of-volume labels. RSTS/E does not perform access checking. A tape volume is considered private to the job which has access to that volume. RMS uses ANSI tape labelling format exclusively. Files may be processed using F (fixed-length) or D (variable-length) record formats.

The RSTS/E BACKUP utility uses ANSI tape format.

Terminal Handling

The RSTS/E terminal handler is designed for interactive environments and features:

- Full-duplex communications
- Modem control
- Type-ahead with immediate echo
- Programmable echo control
- Multiterminal I/O for individual jobs
- Pseudo keyboard capability
- Auto baud detection

The echo control feature allows programs to handle terminal input one field at a time and to retain control of the screen display. This feature gives application programs the capability to use nonblock mode transfer terminals to simulate block mode input. RSTS/E does not support block mode transfer terminals.

Each RSTS/E system includes at least one terminal, the system console terminal, and potentially as many as 126 additional terminals. On systems purchased as DIGITAL supported, the console terminal must be either:

- A hard copy device
- Any terminal supported by RSTS/E when a hard copy device is available on the system

The multiterminal service feature allows any job to control multiple terminals, up to the maximum number configured for the system, on one logical channel. This feature allows one program to control a number of terminals that are all performing the same function.

Pseudo keyboards are logical devices that have the logical characteristics of real, physical terminals but have no hardware associated with them. Pseudo keyboards have input and output buffers to which a program can send output, and from which it can receive input. Using a pseudo keyboard as a communications device, a user can write a program to control other jobs. Each RSTS/E system includes at least one pseudo keyboard. The maximum total number of terminals and pseudo keyboards is 127.

Shared Common Code

RSTS/E allows the sharing of code that is common to multiple jobs. The code that resides in the resident library must be written in the MACRO assembly language.

It is possible to create cluster libraries; that is, resident libraries that share the same address window in the user task's virtual address space.

Disk Data Cache

RSTS/E can minimize accesses to disk for frequently used data by keeping data in a software-maintained cache, a specially designated area of system memory space. The data retained in this cache can be restricted to disk directory blocks only, or it can include data from disk files. In the latter case, a user with the required privileges has the option to allow all disk files to be cached or to allow only certain eligible files to be placed in the cache. Information on the virtual disk is never cached.

It is recommended that data from disk files be stored in the software cache only on systems with greater than 512K bytes (256K words) of memory.

Intertask Communication

RSTS/E jobs can communicate with each other by sending and/or receiving intertask messages under program control. Jobs can send messages to valid message receivers.

Disk File and Device Backup

RSTS/E provides the ability for total or selective backup of accounts and files to disks or to magnetic tapes using DCL commands. This is done through the use of multi-volume container files which may be placed on standard RSTS/E format disks or ANSI labeled magnetic tape. A separate utility is provided for making image copies.

Selective backup is done on-line. Image copies of disk volumes can be made on-line for all volumes except the system disk and off-line for all volumes including the system disk.

RSTS/E BACKUP produces BACKUP sets which are subset compatible with the VAX/VMS BACKUP and can read BACKUP sets produced by VAX/VMS BACKUP. This provides for easy transfer of data between machines running these two operating systems.

RSTS/E BACKUP provides streaming support for streaming tape drives. Refer to Table 1 (hardware support) for a list of tape drives which BACKUP supports in streaming mode.

System Reliability and Maintainability

The error logging mechanism in RSTS/E records certain classes of hardware errors in a disk file. The system manager can print the error log and analyze it on-line.

If a nonrecoverable hardware or system software error causes a system crash, RSTS/E will attempt to produce a

crash dump and then attempt to reload the system and do a "cold restart." The automatic restart capability is enabled at the system manager's option.

The system manager can check the reliability of most peripherals on-line by running the Device Test package.

Software integrity is kept at a high level by using software maintenance tools that allow the system manager to correct software components that are found to be in error. Most parts of the RSTS/E system are maintained by replacing the component in error. Some layered products are maintained by automatic patching procedures.

Program Development Tools

Program development on a RSTS/E system is facilitated by a wide selection of system utilities.

The DIGITAL Text Editor (EDT) can edit all types of text files, including RMS fixed length record files, variable length record files, and stream files.

The RSX emulation provides a keyboard environment similar to that found in the RSX-11M-PLUS Operating System, by providing a subset of the RSX-11M-PLUS system directives. Also included are TASK BUILDER and LIBRARIAN similar to those used by RSX.

The RT-11 run-time system provides an environment similar to that found on the single-job monitor of the RT-11 Operating System, and provides a subset of the RT-11 directives. Also included are a LINKER and LIBRARIAN similar to those used by RT-11.

Standard RSTS/E Software Components

The following software components are supplied as integral parts of the RSTS/E Operating System:

- EDT
- RMS-11
- RMS Utility Programs
- PDP-11 SORT/MERGE
- BASIC-PLUS
- MACRO-11

EDT

EDT is a text editor that can be used to create a file, enter and manipulate text in the file, and save or delete work done during editing sessions. EDT works with any kind of text file. EDT can be used as either a keypad or line editor.

EDT offers many features to make text editing easier and more efficient. These features include:

- On-line HELP that can be used any time during an editing session
- Protection of editing sessions with journaling
- Initialization command file to specify editing characteristics
- Use of several files or parts of files at a time

Record Management Services (RMS-11)

RMS-11 includes a set of run-time service routines and utility programs that provide a data management subsystem. This allows a user to create and manipulate files, and create, access, and alter records within files.

RMS supports sequential, relative, and indexed file organizations.

The indexed file organization allows each indexed file to have one primary key and up to 254 alternate keys. In addition to random access based on key values, programs can access records in an indexed file sequentially in ascending order by key values.

RMS supports fixed length, varialength, variable length with fixed control field, and stream record formats.

Indexed files are restricted to either fixed or variable record formats. The stream record format is restricted to sequential disk files only. Languages that do not use RMS (for example FORTRAN IV) cannot process RMS files unless the record format is stream.

User programs are provided with logical data record access to RMS files through extended language syntax statements. The functions provided by RMS-11 include OPEN, CLOSE, READ/GET, WRITE/PUT, REWRITE/UPDATE and DELETE. The form of the statement is dependent upon the application language.

RMS-11 supports cluster libraries for sharing application virtual address space between a resident library and resident libraries of other software systems that support cluster libraries. The use of separate instruction and data space is also allowed for machines which support this feature.

RMS-11 supports Digital Network Architecture (DNA) Data Access Protocol (DAP). This support allows access by RMS from a RSTS/E system with DECnet/E to RMS files on remote DECnet nodes. The remote DECnet nodes may be RSTS/E, VAX/VMS, RSX-11M or RSX-11M-PLUS systems. In general remote file access appears the same as local file access to the programmer.

RMS Utility Programs

The following set of utility programs support RMS file-structured operations:

FILE DESIGN (DES) and FILE DEFINE (DEF) – Interactive utilities to assist the user in designing files for optimum performance.

RMS BACKUP (BCK) – Creates a backup copy of one or more RMS files from a disk to another disk or to magnetic tape.

RMS RESTORE (RST) – Recreates an original RMS file from the backup copy.

CONVERT (CNV) – Initially loads or adds records to an output file from input data recorded on a sequential, relative or indexed file; creates, supersedes, or extends a sequential output file from an input file.

DISPLAY (DSP) – Lists attributes of RMS files and records.

INDEXED FILE LOAD (IFL) – Initial load utility for indexed files, optimized for performance and space.

File Sort Utility (PDP-11 SORT/MERGE)

RSTS/E includes a file sort utility, PDP-11 SORT/MERGE that accepts as input up to 10 RMS files, and creates a second, reordered RMS file. The input file can contain data stored in binary or ASCII format. The file organization can be sequential, relative, or indexed and the record format can be fixed length, variable length, or stream.

PDP-11 SORT/MERGE also includes a set of subroutines, callable from programs written in one of the languages that use RMS.

BASIC-PLUS

The BASIC-PLUS language processor is comprised of a compiler and run-time system. The BASIC-PLUS compiler produces a compact pseudo code that is interpreted by the run-time system. BASIC-PLUS programs can be saved in either source form or in compiled form (compact pseudo code).

The immediate mode feature of BASIC-PLUS allows single-line statements typed without a line number to be compiled and executed immediately. This is a particularly useful feature in interactive debugging of BASIC-PLUS programs.

BASIC-PLUS can serve as a powerful system programming language. The extensive file processing capabilities of BASIC-PLUS allow users to take full advantage of RSTS/E file processing features. Most system features of RSTS/E are accessible via the flexible SYS system function call mechanism.

In addition to standard features, BASIC-PLUS features long variable names (with extend mode), IF...THEN... ELSE construct, ON ERROR condition handlers, statement modifiers such as IF, UNLESS, WHILE, UNTIL, FOR, multiline statements and program chaining.

MACRO-11

The MACRO-11 assembly language, which uses the PDP-11 instruction set, can be used for development of programs and/or subroutines. The MACRO-11 assembler generates standard relocatable object modules from MACRO-11 source code.

SOURCE CODE INFORMATION

Source code is available in two formats:

- Machine readable (magnetic tape)
- Listings on Microfiche

Source kits include sources for the RSTS/E Monitor, Run-Time systems, and Utilities.

Refer to the ordering information section of this SPD or contact DIGITAL for complete information.

This source code is provided on an **"AS IS"** basis without warranty of any kind, either express or implied.

UNSUPPORTED SOFTWARE COMPONENTS

There are components included with the RSTS/E product which are unsupported but may be useful in specialized situations. They are not required for normal or recommended use of the system. A list of these components is included in the documentation supplied with the RSTS/E product.

MINIMUM HARDWARE REQUIRED

A RSTS/E configuration must include:

- Any PDP-11 CPU from the list below, with line clock or programmable (KW11-P) clock
- Console terminal. Console terminal must be a hard copy device or VT100 or VT200 class terminal with a printer available on the supported system.
- 248K bytes (124K words) of memory
- 10M bytes of disk space
- Software distribution device
- Tape drive or removable disk for backup

OPTIONAL HARDWARE

Refer to Tables 1, 2, and 3 for a list of all hardware supported by RSTS/E.

Hardware limitations may limit the number of devices and/or memory that a particular system can support.

PREREQUISITE SOFTWARE

None

OPTIONAL SOFTWARE

The RSTS/E Optional Software Cross Reference Table (SPD 20.97.xx) lists the software which runs on RSTS/E. There may be several versions available of an optional software product. Refer to the RSTS/E Optional Software Cross Reference Table for the version of the product supported on this version of RSTS/E.

Optional software products may require system resources (e.g., physical memory, disk space) over and above the requirements for RSTS/E. If these extra resources are not available, severe system performance degradation can occur. Refer to SPD for specific resource requirements for each product.

SOFTWARE WARRANTY

Warranty for this software product is provided by DIGITAL with the purchase of a license for the product as defined in the Software Warranty Addendum of this SPD.

INSTALLATION

DIGITAL requires that a customer's first purchase of this software product include DIGITAL Installation Services. These services provide for installation of the software product by an experienced DIGITAL Software Specialist.

For subsequent purchases of this product only experienced customers should attempt installation. DIGITAL recommends that all other customers purchase DIGITAL's Installation Services.

ORDERING INFORMATION

Single-Use licensed software is furnished under the licensing provisions of DIGITAL's Standard Terms and Conditions of Sale, which provide in part that the software and any part thereof may be used on only the single CPU on which the software is first installed, and may be copied, in whole or in part (with the proper inclusion of DIGITAL's copyright notice and any proprietary notices on the software) for use on that same CPU.

You will need a separate license for each CPU on which you will be using the software product (except as otherwise specified by DIGITAL). Then, Materials and Service Options are selected to utilize the product effectively. **THE LICENSE OPTIONS ARE DESCRIBED BELOW. IF YOU ARE NOT FAMILIAR WITH THE SERVICE OPTIONS, YOU MAY OBTAIN THE APPROPRIATE SOFTWARE PRODUCT SERVICE DESCRIPTION(S) FROM YOUR LOCAL DIGITAL OFFICE.** If you are already familiar with these options, you may obtain the ordering information directly from the Software Options Chart.

LICENSE OPTIONS

Single-Use License Option

The Single-Use License is your right to use the software product on a single CPU.

You purchase a Single-Use License according to the category to which your CPU belongs:

- Class H Single-Use License (for high-end systems)
  - — All UNIBUS models and systems
  - — MicroPDP-11/83
- Class L Single-Use License (for low-end systems)
  - — All Q-BUS models and systems except MicroPDP-11/83
  - — KD11, KDF11, KDJ11 CPU modules
  - — DCT11, DCF11, DCJ11 microprocessor chips

For your first installation of this software product you must purchase as a **minimum:**

- Single-Use License option, and
- Distribution and Documentation option

The license gives you the right to use the software on a single CPU and the Distribution and Documentation option provides the machine-readable software and related documentation.

To use this software product on additional CPUs, for each CPU you must purchase as a **minimum:**

- Single-Use License option

In addition to the right to use, the license gives you the one-time right to copy the software from your original CPU installation to the additional CPU. Therefore, the Distribution and Documentation option is not required, but optional.

Distribution and Documentation Option

The Distribution and Documentation option provides the machine-readable software and the basic documentation. You must have, or order, a Single-Use License to obtain this option. You will need this option to install the software for the first time. When revised versions of this software product become available, they may also be obtained by purchasing this option again.

Software Revision Right-To-Copy Option

The Right-To-Copy option allows a customer with multiple CPUs to copy a revised version of a software product from one CPU to another. Each CPU must be licensed for that product. You first install the revised software on one CPU; then you can make copies for additional CPUs by purchasing the Right-To-Copy option for each additional CPU.

Documentation-Only Option

The Documentation-Only option provides one copy of the basic documentation.

Software Product Services

A variety of service options are available. For more information on these or other services, please contact your local DIGITAL office.

SOURCE MATERIALS OPTIONS

You can obtain optional source materials for this software product by signing DIGITAL's Software Program Sources License Agreement and then purchasing the source option(s) you want. The agreement entitles you to use the source materials at one customer facility or location which is specified in the agreement.

Most users do not require source materials. They are used primarily to make modifications to the software product. Source kits provided by DIGITAL do not necessarily contain all source files used by DIGITAL to build binary kits.

Source License and Sources Distribution Option

This option provides you with the machine-readable source code for this software product. It gives you the right to use the source code on any CPU at the facility/location specified in the agreement which has a Single-Use License for the object code.

Source License and Sources Listings Option

This option provides you with listings of the source programs for this software product. It gives you the right to use the listings for any CPU at the facility/location specified in the agreement which has a Single-Use License for the object code.

Sources Update Distribution Option

This option provides you with the revised version of the machine-readable source code for this software product. You must have purchased the Source License and Source Distribution Option to obtain this option.

Sources Update Listings Option

This option provides you with listings of source code for the revised version of the software product. You must have purchased the Source License and Source Listings Option to obtain this option.

Sources Update Distribution and Listings Option

This option provides you with the revised version of the machine-readable source code and listings for this software product. You must have purchased the Source License, Source Distribution and Listings Option to obtain this option.

SOFTWARE OPTIONS CHART

The distribution Media Codes used in the Software Options Chart are described below. You specify the desired Media Code at the end of the Order Number, e.g. QR430-H5 = binaries on TK50 Tape Cartridge.

5 = TK50 Tape Cartridge
D = 9-track 800 BPI Magtape (NRZI)
H = RL02 Disk Cartridge
M = 9-track 1600 BPI Magtape (PE)
R = Microfiche
V = RK07 Disk Cartridge
Z = No hardware dependency

NOTE: The availability of these software product options and services may vary by country. Customers should contact their local DIGITAL office for information on availability.

OPTIONS	ORDER NUMBER
LICENSE OPTIONS: A LICENSE IS REQUIRED FOR EACH CPU.	
Single-Use License Class H*	QR430-UZ
Single-Use License Class L*	QY430-UZ
MATERIALS AND SERVICE OPTIONS:	
Start-Up Service Package, Level III	QR430-B5 QR430-BD QR430-BH QR430-BM QR430-BV
Start-Up Service Package, Level II	QR430-75 QR430-7D QR430-7H QR430-7M QR430-7V
Start-Up Service Package, Level I	QR430-55 QR430-5D QR430-5H QR430-5M QR430-5V
Distribution and Documentation Option	QR430-H5 QR430-HD QR430-HH QR430-HM QR430-HV
Software Revision Right-To-Copy Option	QR430-HZ
Documentation Only Option	QR430-GZ
System Manager Documentation	QR432-GZ

* Refer to the descriptions of Class H and Class L single-use licences in the License Option Section of this SPD.

SOFTWARE OPTIONS CHART (continued)

OPTIONS	ORDER NUMBER
Installation Service Option	QR430-I5 QR430-ID QR430-IH QR430-IM QR430-IV
DECsupport Service	QR430-95 QR430-9D QR430-9H QR430-9M QR430-9V
Basic Service	QR430-85 QR430-8D QR430-8H QR430-8M QR430-8V
Self-Maintenance Service	QR430-35 QR430-3D QR430-3H QR430-3M QR430-3V
Source License and Sources Distribution for RSTS/E Monitor, Run-Time Systems and Utilities	QR430-EM
Source License and Sources Listings for RSTS/E Monitor, Run-Time Systems and Utilities	QR430-FR
Sources Distribution for RSTS/E Monitor, Run-Time Systems and Utilities	QR430-NM
Sources Listings for RSTS/E Monitor, Run-Time Systems and Utilities	QR430-NR
Interim Update of Source Distribution for RSTS/E Monitor, Run-Time Systems and Utilities	QR430-LM
Interim Update of Source Listings for RSTS/E Monitor, Run-Time Systems and Utilities	QR430-LR

TABLE 1

Supported Processor Information

Processor Type	**MicroPDP-11/23/ 73/83**	**11/23-PLUS**	**11/24**	**11/34 11/34A**
Processor Features	KEF11-B (on /23) KEF11-AA (on /23) FPF11 (on /23) FPP (Std on /73/83) FPJ (opt on /73/83)	KEF11-B KEF11-AA FPF11	KEF11-B KEF11-AA FPF11	FPP
Parity or ECC				
Min. Memory	256KB	256KB	248KB	248KB
Max. Memory	3.8MB	3.8MB	3.8MB	248KB
Cache Memory	None on 11/23 8KB Std on 11/73/83	None	None	2KB opt. on 11/34A
Peripheral Interface	Q-BUS	Q-BUS	UNIBUS	UNIBUS

TABLE 1 (Continued)

Supported Processor Information

Processor Type	**11/35 11/40**	**11/45/50 11/55/60**	**11/44**	**11/84**	**11/70**
Processor Features	EIS (Req) FIS	FPP FPP Std on /60 FP11-E Opt on /60	FPP CIS	FPP (Std) FPJ (opt)	FPP
Parity or ECC					
Min. Memory	248KB	248KB	512KB	512KB	512KB
Max. Memory	248KB	248KB	3.8MB	3.8MB	3.8MB
Cache Memory	None	2KB Std. on 11/60	8KB Std	8KB Std	2KB Std
Peripheral Interface	UNIBUS	UNIBUS	UNIBUS	UNIBUS	UNIBUS MASSBUS

TABLE 2

Supported Peripherals

Processor	**MicroPDP-11/23/73/83/ 11/23-PLUS**	**PDP-11/24/34/34A PDP-11/35/40/45 PDP-11/50/55/60 PDP-11/44/84**	**PDP-11/70**
Maximum Number of Disk Units			
RX01/2 (Non-RSTS File Structure)	8 X RX01	8	8
RX50[1]	16	16	16
RD51/2/3[1]	16	–	–
RK05 (data disk only)	–	8	8[5]
RK06/7[2]	–	8	8[5]
RL01/2[4]	4 RL02	4	4[5]
RP02/3	–	8	–
RH11 – RP04/5/6, RM02[3]	–	8	–
RH70 – RP04/5/6, RM02/3/5/80[3]	–	–	16
UDA50/50A – RA80/81/60[1,2]	–	16	16[5]
KDA50-Q – RA80/81/60[1,2]	16	–	–
RC25[1]	16	16	16[5]
Tape Units	Up to 4: TSV05 or TK25	Up to 8: TE16, TU16, TU45, TU77 (4 max.)	UNIBUS Tapes Up to 8: TE10, TU10, TS03 Or up to 4: TS11, TU80
	Up to 2: TK50[7]	Up to 8: TE10, TU10, TS03 or up to 4: TS11, TU80	Up to 8: TU56 Up to 2: TK50[7] TU81[7]
		Up to 8: TU56	MASSBUS Tapes Up to 8: TE16, TU16; TU45 (4 max.) TU77
Distribution Media	RL02	800 bpi tape (2400 FT)	800 bpi tape (2400 FT)
	1600 bpi tape TK50 cart. tape	1600 bpi tape RK07, RL02, TK50	1600 bpi tape RK07, RL02, TK50
Terminals	Up to 14 Supported Terminals	Up to 127 Supported Terminals	Up to 127 Supported Terminals

TABLE 2 (Continued)

Supported Peripherals

Processor	**MicroPDP-11/23/73/83/ 11/23-Plus**	**PDP-11/24/34/34A PDP-11/35/40/45 PDP-11/50/55/60 PDP-11/44/84**	**PDP-11/70**
Interfaces	Up to 3: DZV11-C DZQ11 DHV11	Up to 31: DL11-A/B/C/D Up to 32: DL11-E Up to 16: DJ11 DH11[6], DHU11 DZ11	Up to 31: DL11-A/B/C/D Up to 32: DL11-E Up to 16: DJ11 DH11[6], DHU11, DZ11
Printers	Up to 8 LPV11 and supported printer	Up to 8 LP11 and supported printer	Up to 8 LP11 and supported printer
Modems	DF01-A DF02, DF03, DF112 Bell 103A Compatible	DF01-A DF02, DF03, DF112[8] Bell 103A Compatible With DMC11 & DMR11: DF126, DF127, DF129	DF01-A DF02, DF03, DF112[8] Bell 103A Compatible With DMC11 & DMR11: DF126, DF127, DF129
Other Peripherals Card Readers Paper Tape Reader/Punch		1 CM11 or 1 CR11 and 1 CD11 1 PC11	1 CM11 or 1 CR11 and 1 CD11 1 PC11

Table 2 Footnotes:

(1) RSTS/E supports up to four (4) MSCP class controllers per system. Each controller supports up to four (4) MSCP class disk units.

(2) These dual ported disks cannot be used from two (2) systems simultaneously.

(3) These dual ported disks can be accessed as READONLY from two (2) systems simultaneously.

(4) A minimum of two (2) RL01 capacity disks plus a software distribution device is required.

(5) On the PDP-11/70 when MSCP class disks (for example UDA50/RA81/RA60/RC25) are present, combinations of these disks must be the only disks on the UNIBUS.

(6) DM11-BB is required for DH11 dial up.

(7) RSTS/E supports up to two (2) TMSCP class controllers. Each controller supports one (1) TMSCP class tape unit.

(8) The DF112 DIALOUT capability is not supported on DH11 interfaces.

TABLE 3: Supported Terminals and Printers

Terminals

LA12, LA34, LA36, LA38, LA50,
LA100, LA120, LA180, LA210

VT52, VT55, VT100, VT101, VT102,
VT125 (as VT100 in ANSI mode only)
VT131 (as VT100 or VT102 only)
VT220, VT240, VT241

DECmate I/II/III in CX Mode

PC 300 Series (P/OS with VT102 subset terminal emulation)

Rainbow 100 series (with VT102 subset terminal emulation software)

LQP02, LQP03, LN03

Printers

LP11 - A/B/C/D/EA/EB/F/G/H/J/K
LP11 - R/S/V/W/X/Y/Z
LN01
(These LP11 options include LP11 interface plus designated printer)

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Software Warranty Addendum

TO SOFTWARE PRODUCT DESCRIPTION

SOFTWARE PRODUCTS (Qxxxx-UZ)

The software product is warranted to conform to the Software Product Description (SPD). This means that DIGITAL will remedy any nonconformance when it is reported to DIGITAL by the customer during the warranty period.

The warranty period is ninety (90) days. It begins when the software is installed or thirty (30) days after delivery to the end user, whichever occurs first and expires ninety (90) days later. All warranty related support for this software will end 180 days after release of the subsequent version.

Warranty is provided in the country of purchase. DIGITAL will provide a service location which will accept reporting (in a format prescribed by DIGITAL) of a nonconformance problem caused when using the licensed software under normal conditions as defined by the SPD. DIGITAL will remedy a nonconformance problem in the current unaltered release of the licensed software by issuing correction information such as: correction documentation, corrected code, or notice of availability of corrected code; or a restriction or a bypass. The customer will be responsible for the preparation and submission of the problem report to the service location.

WARRANTY EXCLUSION

DIGITAL DOES NOT WARRANT THAT THE SOFTWARE LICENSED TO CUSTOMER SHALL BE ERROR FREE, THAT THE SOFTWARE SHALL OPERATE WITH ANY HARDWARE AND SOFTWARE OTHER THAN AS SPECIFIED IN THIS SPD, THAT THE SOFTWARE SHALL SATISFY CUSTOMER'S OWN SPECIFIC REQUIREMENTS, OR THAT COPIES OF THE SOFTWARE OTHER THAN THOSE PROVIDED OR AUTHORIZED BY DIGITAL SHALL CONFORM TO THE SPD.

DIGITAL MAKES NO WARRANTIES WITH RESPECT TO THE FITNESS AND OPERABILITY OF MODIFICATIONS NOT MADE BY DIGITAL.

IF THE SOFTWARE FAILS TO FUNCTION FOR REASONS STATED ABOVE, THE CUSTOMER'S WARRANTY WILL BE INVALIDATED AND ALL SERVICE CALLS WILL BE BILLABLE AT THE PREVAILING PER CALL RATES.

This Software Warranty Addendum is effective for licensed software products ordered in the United States after November 1, 1985 and supersedes all prior versions.

November 1985

AE-HD44A-TK

Software Product Description

RSTS/E Optional Software Cross Reference Table

SPD 20.97.26

This table has been prepared to assist in determining which RSTS/E optional software products are supported by RSTS/E, Versions 9.0, 9.1, and 9.2. Refer to theTappropriate SPD for all other details on a particular product.

	RSTS/E (13.01.xx)			
Optional Software	**SPD No.**	**V9.0**	**V9.1**	**V9.2**
ADE/RSTS	13.11.xx	2.4	2.4	2.4
BASIC-PLUS-2 for RSTS/E, PDP-11	14.54.xx	2.3	2.3	2.3
COBOL, PDP-11	12.40.xx	4.4	4.4	4.4
COBOL-81/RSTS/E	13.16.xx	2.3	2.3	2.4
DATATRIEVE-11	12.48.xx	3.1	3.1	3.1
DECdx/RSTS	13.32.xx	1.0	1.0	1.0
DECmail-11	13.19.xx	2.0	2.0	2.0
DECnet/E	10.73.xx	2.1	2.1	2.1
DECWORD/DP	13.14.xx	1.2	1.2	1.2
DMS-500	13.05.xx	–	–	–
FMS-11/RSTS	13.17.xx	1.5	1.5	1.5
FORTRAN IV/RSTS/E	12.41.xx	2.6	2.6	2.6
FORTRAN-77/RSTS/E, PDP-11	14.49.xx	5.0	5.0	5.0
MENU-11/RSTS	12.60.xx	2.0	2.0	2.0
PDP-11 Symbolic Debugger/RSTS/E (formerly FORTRAN-77 DEBUG/RSTS/E)	12.79.xx	1.0	1.0	2.0
PLXY-11/RSTS	14.16.xx	1.3	1.3	1.3
PRO-IV	A1.09.xx	–	–	–

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	RSTS/E (13.01.xx)			
Optional Software	**SPD No.**	**V9.0**	**V9.1**	**V9.2**
RPG II, PDP-11	13.21.xx	8.8	8.8	8.8
RSTS Smart Mailer	13.23.xx	–	–	–
RSTS/E DECgraph-11	15.24.xx	–	–	–
RSTS/E DIBOL	14.08.xx	5.1A	5.1A	5.2
RSTS/E High Performance 2780/3780 Emulator*	10.49.xx	–	–	–
RSTS/E INDENT	12.33.xx	1.4	1.4	1.4
RSTS/E-2780*	10.50.xx	–	–	–
RSTS/E 3271 PE*	10.83.xx	–	–	–

* Will not execute on the PDP-11/23-PLUS or MicroPDP-11.