digital

Software Product Description

PRODUCT NAME: **RSX-11D, Version 6B, Real-Time Operating System** **SPD 14.55.3**

DESCRIPTION:

RSX-11D is an event driven, disk based, multiprogramming, real-time operating system for the PDP-11/35, 11/40, PDP-11/45, 11/70. It utilizes memory management hardware to isolate all other areas of memory from a currently running program and to allow a program to be loaded anywhere in memory WITHOUT modification. The system is process-structured and provides priority queued asynchronous I/O, a powerful file structure, flexible scheduling, and 250 levels of software priority.

The system is designed for use in applications that require disk storage of programs and data, rapid loading of programs and response to interrupts, and/or convenient scheduling of operations.

The basic program unit executing under RSX-11D is the TASK which may consist of a program module or a set of program modules. Program modules are linked together and to the operating system by an overlay task builder and stored on the disk in absolute image form. Task execution may be invoked by other tasks or from a terminal. Tasks can be specified to a) execute in an indicated memory partition, b) execute at a given priority, c) execute under an indicated User Identification Code, or d) execute only if memory is available. Tasks may be defined as checkpointable which allows them to be swapped out of memory when space is required for execution of higher priority tasks. Optionally, they may be declared as multiuser. Multiuser tasks are shareable, allowing more than one user to have access to the reentrant part of the task in parallel by duplicating only the date dependent code in memory.

Multi-programming of tasks is provided by RSX-11D by assigning a software priority level (1-250) to each task and allowing for the interruption of a lower priority task when higher ones require the CPU resources. Event flags are provided to allow the individual task to control its execution window and to allow communication with other tasks and the operating system.

Console operations for RSX-11D are supported by a family of tasks called the Monitor Console Routines (MCR). A standard system contains routines for system service requests, utility functions, and the following operations:

Log on and log off
Enter or display current time and date,
Install or remove tasks,
Mount or dismount peripheral volumes,
Initialize peripheral volumes,
Run and schedule tasks,
Create directory on a volume,
Set system defaults,
List installed tasks,
List devices,
List memory partitions,
List common memory areas,
Assign a logical unit number (LUN) of an indicated task to an indicated physical device-unit,
List LUN assignments for an indicated task,
Save a system image (for next boot),
Examine (and alter) memory locations.

The RSX-11D File System provides support of files on the RK05, RP03, RP04, RS03, RS04 and RS11 disks. Four levels of file protection (SYSTEM, OWNER, GROUP, and WORLD) are supported via four levels of access (READ, WRITE, EXTENSION, and DELETION). Both a sequential and random access are supported for block structured and fixed length record files: variable length record files may be processed sequentially only. All types of files may be expanded dynamically.

Other functions supported by the system are:

- 11/70 Extended memory support to a system total of 1024K words
- 11/70 Cache parity checking and error logging support.
- Time-scheduled partition option.
- ANSI, multi-volume, magnetic tape support (fixed and variable length records).
- I/O spooling to the disk for low speed peripherals (printer, TTY, and card reader) with associated queue entries and operator output control.
- Job/task accounting of CPU usage, device accesses, and disk storage.
- Error logging for system disks including an error analysis task and error report generator.
- Optional on-line diagnostic handler tasks for system disks.

The program development and utility functions provided by the standard RSX-11D system are as follows:

- Peripheral Interchange Program, PIP
- File Transfer Utility, FILEX

- File Dump Utility, DMP
- File Verification Utility, VERIFY
- Source Language Program Editor, SLIPR
- Character Oriented Text Editor, EDIT
- Library Management Utility, LBR
- PDP-11 Macro Assembler, MACRO
- Task Builder Overlay Linker, TKB
- Single Stream Batch, BATCH
- FORTRAN IV Compiler, FOR
- On-line Volume Back-up Utility, PRE
- System Generation Program, SGNI
- On-line Debugging Technique, ODT
- Task Image Patch Program, ZAP

Memory Recommendations

Single-user System

RSX-11D systems are distributed as bootable 48K words systems where memory is partitioned as follows:

EXEC - Resident Kernal Executive
SCOM - Tables, Lists, Code, and Nodes
SYDISK - Partition for System Disk Handler
TTY - Partition for single TTY Terminal
MCR - Partition for MCR and some MCR functions
GEN - General purpose partition for user tasks and libraries, e.g., SYSRES

This configuration is the minimum recommended for a single command system. Non-batch program development is possible with this configuration, but it is not recommended primarily because of limited symbol capabilities with the assembler and compiler running in this smaller environment.

Multi-User System

A 56K words configuration with at least two million words of disk storage is recommended for simultaneous operation. This provides adequate space for FORTRAN IV libraries, a background compilation of large FORTRAN programs, residency of several device Handler Tasks.

The distributed (full) RSX-11D system requires approximately 86% of an RK cartridge and, thus, more than one RK drive may be necessary to meet the disk storage requirements for an application.

MINIMUM HARDWARE REQUIRED:

- One console Terminal (from Terminals section)
- 48K words of memory
- One of the following Processor systems:

  PDP-11/35, KE11-E, KT11-D, one bootstrap, one clock
  PDP-11/40, KE11-E, KT11-D, one bootstrap, one clock
  PDP-11/45, KT11-C, one bootstrap, one clock
  PDP-11/70

- One system disk

  RK11 (one RK05 drive)
  RPR11 (one RP02 drive)
  RP11 (one RP03 drive)
  RJP04/RWP04 (one RP04 drive)

- One of the following:

  An additional RK05 drive
  TMA11/TM11 (one 9-track TU10 drive)
  TMA11/TM11 (one 7-track TU10 drive)
  TJU16/TWU16 (one TU16 drive)

OPTIONAL HARDWARE SUPPORTED:

Processors:

PDP-11/35, 11/40, 11/45, 11/70

Memory:

System total of 124K words (1024K words on)

Processor Options

KT11-C Memory Management Unit (PDP-11/45)
KT11/D Memory Management Unit (PDP-11/35, 11/40)
KE11-E Extended Instruction Set (EIS) (PDP-11/35, 11/40)
KE11-F Floating Point Instruction Set (FIS) (PDP-11/55, 11/40)
FP11-B Floating Point Processor (FPP) (PDP-11/45, 11/70)
FP11-C Floating Point Processor (FPP) (PDP-11/70)

Bootstrap Options

BM792-YB for RK11, TC11
BM792-YL for RX11
MR11-DB for RF11, RK11, TC11, TM11, RP11
BM873-YA for RF11, RK11, TC11, TM11, RP11, TA11, PC11
BM873-YB for RF11, RK11*, TC11, TM11, RP11*, TA11, PC11,
RJS03/RWS03*, RJS04/RWS04*, TJU16/TWU16, RJP04/RWP04*

NOTE: PDP-11/70 processor configurations automatically include the M9301 bootstrap. This satisfies the bootstrap requirement.

Clocks:

KW11-L Line Frequency Clock
KW11-P Programmable Clock

Terminals:

LA30 80 column DECwriter
LA36 132 column DECwriter II
LT33/LT35 ASR 33/35 Teletype
VT05/VT05B Alphanumeric Display Terminal
VT50** Alphanumeric Display Terminal Family

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*These devices may boot from units other than unit zero.

**No MCR Support is provided for escape sequences.

Paper Tape:

PR11 300 character/second paper tape reader
PC11 300 character/second paper tape reader with 50 character/second punch

Card Readers:

CR11 300 card/minute, 80 column, punched card reader
CM11 285 card/minute, 80 column, mark sense card reader
CD11A/E 1000/1200 card/minute, 80 column, punched card reader

Line Printers:

LA35 Receive only, 132 column DECwriter II
LS11 132 column, 165 character/second serial printer
LP11 Line Printer Family (all models), 80-132 columns, 300-1200 lines/minute
LV11*** 500 line/minute electrostatic printer/plotter

Magnetic Tapes:

TA11 Magnetic Tape Cassette System
TC11 DECtape System
TMA11/TM11 Industry Standard, half inch magnetic tape, NRZI recording
TU10 7-track - 200, 556, and 800 BPI (45 IPS)
TU10 9-track - 800 BPI only (45 IPS)
TS03 9-track - 800 BPI only (12.5 IPS)
TJU16/TWU16 9-track, dual density tape system
800 BPI, NRZI recording, 45 IPS
1600 BPI, Phase encoded recording, 45 IPS

Disk Storage:

RK11-D Moving head disk system (1.2 million words/cartridge)
RPR11 Moving head disk system (10 million words/pack)
RP11 Moving head disk system (20 million words/pack)
RJP04/RWP04 Moving head disk system (44 million words/pack)
RF11 Fixed head disk system (256,000 words/drive)
RJS03/RWS03 Fixed head disk system (256,000 words/drive)
RJS04/RWS04 Fixed head disk system (512,000 words/drive)

Line Interfaces:

DL11 Single, asynchronous, serial line (models A,B, C,D,E)
DJ11 16 Line, asynchronous, serial line multiplexer
DH11 16 Line, programmable, asynchronous, serial line multiplexer
DM11-BB Modem control multiplexer for the DH11

Data Acquisition/Control:

AD01 Multichannel Analog to Digital converter
AFC11 Multichannel Analog to Digital converter
LPS11 Laboratory Peripheral System
LPS11-S* Bus control, box, power supply, etc.
LPSAD-12* 8 channel A/D multiplexer (12 bits) and LEDs
LPSKW* Programmable clock and Schmitt triggers
LPSDR-A* 16 bit digital I/O registers and relays
BA408 8 channel gain ranging option to LPSAD-12
LPSAM 8 channel A/D multiplexer expansion to LPSAD-12
LPSAM-SG 8 channel gain ranging option to LPSAM
LPSVC D/A converters and display control
LPSAM-E 8 channel A/D multiplexer expansion up to 64 channels. Requires LPS11-E to be used in place of LPS11-S
UDC11 Universal Digital Controller
IDA11-AA Contact sense module
IDA11-AB Contact sense module
IDA11-BA Contact interrupt module
IDA11-BB Contact interrupt module
IDA11-CA I/O converter
IDA11-DA Solid state AC/DC driver
IDA11-EA Flip-flop DC driver
IDA11-FA Single shot driver
IDA11-GA Latching output relay
IDA11-HA Flip-flop output relay
IDA11-JA Single shot output relay
IAA11-AA Multi-range A/D converter
IAA11-BA D/A converter
IAA11-BB D/A converter
IAA11-BC D/A converter
IAA11-BD D/A converter

Special Hardware Options

CTS11 Card Reader/Punch (Available from Computer Special Systems)

PREREQUISITE SOFTWARE:

None.

OPTIONAL SOFTWARE SUPPORTED:

Other software available under separate license agreement are:

COBOL, a PDP-11 ANSI 74 Compiler
FORTRAN IV-PLUS, a high performance FORTRAN Compiler
RSX-11D/2780 Emulator Package

TRAINING CREDITS:

Three training credits are included with the supported Binary License.

***No software support is provided for the plotter.

*These options are REQUIRED for support of the LPs.

SUPPORT CATEGORY:

A, Software Support will be provided as listed in the Software Support Categories Addendum to this SPD.

UPDATE POLICY:

During the first year, Update Policy shall be in accordance with the Software Support Categories Addendum to this SPD. After the first year, updates, if any, will be made available according to then prevailing Digital policies.

ORDERING INFORMATION:

This software is furnished under a license for use on a single CPU and can be copied and modified (with inclusion of Digital's copyright notice) only for use on such CPU, except as may otherwise be provided in writing by Digital.

Binary Options with no support services are only available after the purchase of at least one full-support license and after either an "OEM Agreement" or End-User "Waiver of Support Agreement" is in effect. When a software license is ordered without services, the category of support applicable to such software is Category C.

Source and/or listing options are only available after the purchase of at least one full-support binary license and after a source license agreement is in effect.

The following key (D,E,F,P,R,Z) represents the distribution media available for the product and must be specified at the end of the "Q" number, i.e., QJ580-AD = binaries on 9-track Magtape.

D -	9-track Magnetic Tape Kit (TU10 & TU16)	P -	9-track Magtape (TU16)
E -	DECpack Kit	R -	Microfiche
F -	7-track Magnetic Tape Kit	Z -	No Hardware Dependency

Standard Options

QJ580-A– Single-use license, binaries, selected source modules, support services, documentation (media: D,E,F)
QJ580-C– Single-use license, binaries, selected source modules, no support services, documentation (media: D,E,F)

Source/Listing Options

Microfiche listings of updates are provided automatically, at no extra charge, to those customers who have purchased microfiche and are within the first year following installation or are subscribers to the Standard Binary Program Update Service.

QJ580-E– All Program Sources (media: D,E,F)*
QJ583-E– Utility Program Sources (media: D,E,F)*
QJ584-E– FORTRAN IV Compiler Sources (media: D,E,F)*
QJ585-E– Exec., Drivers, File System, FORTRAN OTS Sources (media: D,E,F)*
QJ580-F– All Program Listings (media: R)
QJ583-F– Utility Program Listings (media: R)
QJ584-F– FORTRAN IV Compiler Listings (media: R)
QJ585-F– Exec., Drivers, File System, FORTRAN IV OTS Listings (media: R)

Upgrade Options

The following options are available as an upgrade kit from RSX-11M to RSX-11D. The no-support option is available only after purchase/conversion of at least one full-support license.

QP580-A– Single-use license, binaries, key source modules, support services, documentation (media:D,E,F)
QP580-C– Single-use license, binaries, key source modules, no support services, documentation (media: D,E,F)

Update Options

Users of RSX-11D, Version 4 whose Standard Binary Program Update Services have expired, may purchase the following:

QJ580-H– Update of binaries, key source modules, documentation, no support services (media: D,E,F)
QJ580-N– Update of all Program Sources (media: D, E,F)*
QJ580-N– Update of all Program Listings (media: R)

Miscellaneous Options

QJ580-G– Predelivery kit (media: Z)

ADDITIONAL SERVICES:

After the first year, two extended software maintenance contracts are offered:

Information Service

This contract service provides the subscriber with monthly issues of the "RSX-11D Dispatch" (System newsletter) and the Software Performance Reporting (SPR) Service for a period of one year, starting with the date of subscription to the contract.

QJ580-2– Information Service (media: Z).

Standard Binary Program Update Service

This one year contract includes the information service as well as providing the subscriber with software updates, at no additional charge, as they become available during the subscription period.

QJ580-3– Standard Binary Program Update Service (media: D,E,F,P).

*Includes listings on microfiche.

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